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PROCEEDINGS OF

THE LINNEAN SOCIETY OF LONDON

155th Session (1942–43) Part 1

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PROCEEDINGS OF

THE LINNEAN SOCIETY OF LONDON

155th Session (1942–3) Part 1

PROCEEDINGS OF THE GENERAL MEETING

29 October 1942

Dr. E. S. Russell, O.B.E., M.A., President, in the Chair

The Proceedings of the General Meeting held on Thursday, 9 July 1942, having been circulated, were taken as read and confirmed.

The following were thanked for gifts made to the Library since the last meeting :—Mr. C. G. Dobbs, Prof. Alfred Ernst, Prof. R. R. Gates, Dr. L. S. B. Leakey, Mr. A. E. Wade, Mr. T. E. Wallis, Prof. F. E. Weiss, Dr. E. B. Worthington, India Office Library, University of Sheffield and King's College, London.

Read for the first time certificates of recommendation of the following candidates for Fellowship : in favour of Alexander James Edward Cave, M.D., George Woodrouffe Harris, B.A., James Desmond Smyth, B.A., B.Sc., Ph.D., Edgar Pickard, Frank David Armitage, Alfred Deans Peggs, B.S., M.Sc.

The President reported the deaths of the following members : Miss Alice M. Geldart, Surgeon Rear-Admiral W. G. Axford and Mr. E. J. Wortley, C.M.G., O.B.E., Fellows of the Society ; and that Mr. F. Flippance, whose death was reported to the Society on 30 April 1942, is still alive and interned at Hong Kong.

The following two exhibits were made and discussed :—

S./Ldr. M. C. Rawlence. A photograph of *Epipactis purpurata* Sm. (*E. violacea* Bor.) taken near Clandon, Surrey, showing how this orchid grows on ground covered with deep litter. In the neighbourhood of the plant photographed was a large wasp-nest, and the wasps were observed actively pollinating the flowers.

Dr. Margaret A. Brett, F.L.S. A nest of small potatoes formed within the decayed skin of another.

The following paper was read :—

Dr. C. B. Williams and James Fisher. The relation between the number of individuals and the number of species in a random sample of animal population. [Discussed by Dr. A. S. Corbet, the President, Mr. J. R. Norman, Mrs. S. M. Harding, and Dr. J. Ramsbottom ; Dr. C. B. Williams and Mr. Fisher replied.]

Abstract.—

When a random sample of a mixed insect population is taken, as, for example, by random collecting or by a light trap, it is found that the frequency of species represented by one, two, three, etc., individuals form a hollow curve somewhat resembling a hyperbola. The observed results have been shown to fit very closely indeed to a mathematical series suggested by Professor R. A. Fisher. This series can be calculated for any sample if the total number of individuals and the total number of species is known. Furthermore, an ' index of density ' can be calculated which is a characteristic of the population and expresses the extent to which the individuals are divided among species. Also, if the number of species represented in one random sample of population is known, the number of species likely to be found in samples of any other size—larger or smaller—from the same population can be calculated, and the calculations were shown to be in very close agreement with results obtained. Full particulars are to be published shortly.

Discussion.—

Dr. A. Steven Corbet.—In considering this relationship between individuals and species in an animal population, it is important to see how far the condition of random sampling is fulfilled before we interpret the results as representing the conditions obtaining among the whole of the animal population sampled.

As far as my collection of Malayan Rhopalocera is concerned, I think that this can fairly be regarded as a random sample because the greater part of the Peninsula is under primeval forest and, in this plant association, the butterfly species are distributed in a remarkably uniform manner, although some species are montane in habitat and others are confined to the plains. In Malaya, very few instances are known of localization of species such as occurs with many species of English butterflies. The secondary plant-associations, which are largely coastal, are inhabited by relatively few species of common butterflies, and any inaccuracies in their numbers introduced in the present study only affects a small and relatively unimportant part of the curve.

The closer fit to Professor Fisher's series achieved by Dr. Williams' results with the moth traps indicates that these results more nearly represent a random sample than is the case with the hand-collected Malayan butterflies.

The restriction of many species of birds and insects to a few special haunts in Britain makes random sampling of the whole population very difficult : on the other hand, a random sample from a small uniform area has the disadvantage that the results are only applicable to the area sampled and, in general, too few species and individuals would be obtained to give results of much significance.

Dr. J. Ramsbottom exhibited and described lantern-slides of British edible and poisonous Fungi. (Discussed by Dr. L. R. Wheeler, Mr. J. Chear, Mr. I. H. Burkill, Mr. H. Meyer, Mr. H. C. Bibby, Mr. W. C. Worsdell ; Dr. J. Ramsbottom replied.)

PROCEEDINGS OF THE GENERAL MEETING
12 November 1942
[A Meeting held conjointly with the Zoological Society of London]

Dr. B. Barnes, Vice-President,
in the Chair

The Proceedings of the General Meeting held on Thursday, 29 October 1942, having been circulated, were taken as read and confirmed.

The Vice-President in the Chair announced that during the present Session the Society's General Meetings would be held conjointly with The Zoological Society. He also invited Fellows to send in the titles of books which could be added to the Library in the present circumstances ; such recommendations to be submitted to the Library Committee.

The following were thanked for gifts made to the Library since the last meeting :—Dr. Walter Knoche, The Cambridge University Press and The Royal College of Surgeons of England.

Read for the second time certificates of recommendation of the following candidates for Fellowship : in favour of Alexander James Edward Cave, M.D., George Woodrouffe Harris, B.A., James Desmond Smyth, B.A., B.Sc., Ph.D., Edgar Pickard, Frank David Armitage, Alfred Deans Peggs, B.Sc., M.Sc.

The following communications were read and discussed :—

Mr. K. N. Kaul. A palm stem from the Miocene of Antigua, W.I., *Phytelephas Sewardii*, sp. nov. (Discussed by Mr. W. N. Edwards and the Vice-President in the Chair ; Mr. Kaul replied.) [Printed in full below.]

Prof. Alexander Fleming. The use of paper and cellophane disks for the preparation of museum specimens of Mould cultures. [Printed below, p. 5.]

Mr. E. W. Mason. Remarks on variation and changes in the appearance of Moulds. [Printed below, p. 6.]

Dr. B. P. Uvarov. Orthoptera of the Siwa Oases. (Discussed by Dr. Malcolm Smith, Mr. I. H. Burkill, the Vice-President in the Chair, and Mr. K. N. Kaul.) [Printed in full below, p. 8.]

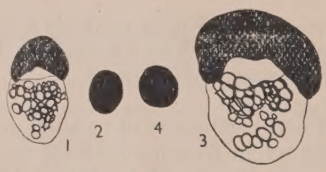
A PALM STEM FROM THE MIOCENE OF ANTIGUA, W.I.— PHYTELEPHAS SEWARDII, SP. NOV.

By K. N. Kaul.

In my paper on ' The anatomy of the stem of Palms and the problem of the artificial genus *Palmoxylon* Schenk ' (Proc. Linn. Soc. Lond.,

Session 1941–42, p. 65) I suggested that it is possible to split the artificial genus *Palmoxylon* Schenk into a large number of natural genera of which the affinities, or even identity, with the modern genera could be ascertained with some degree of confidence by a detailed comparison with the anatomy of the stems of the modern species of palms. This is now illustrated by the case of a fossil petrified stem of a palm from the West Indian island of Antigua. It resembles in its structure the modern *Phytelephas macrocarpa* Ruiz & Pavon to such a great extent in all its anatomical characters that I have no doubt that the fossil species is a species of *Phytelephas*.

Material.—The species is represented by an irregularly-cut silicified block about 9 cm. in width and 7 cm. in height. The cut sides show typical monocotyledonous structure of wood. The fibrovascular bundles are conspicuous on account of a mineral deposit which changes its colour from light yellow to reddish brown. Preservation is good, but only the central part of the stem is represented.



FIGS. 1 and 2.—A fibrovascular bundle and a fibrous bundle of *Phytelephas macrocarpa*. FIGS. 3 and 4. The same of *P. Sewardii*. All × 16.

Description.—In the transverse section a large number of scattered fibrovascular bundles with irregular orientation are seen mixed up with fibrous bundles in a ground-tissue which is just preserved to indicate that it was of a compact nature and not lacunar. Distribution of fibrovascular bundles 68 per square centimetre. The fibrovascular bundles are exactly like those of the modern species *Phytelephas macrocarpa*, with a large number of xylem vessels in the vascular part, instead of one or two as appear in other palms. Sclerenchyma well developed, reniform, practically of the same size as the vascular parts. The fibrous bundles are big, circular and conspicuous in the tranverse section and evenly distributed in the ground tissue. Stigmata are present round the sclerenchyma of the fibrovascular bundles and of the fibrous bundles. Preservation of the ground tissue is not good, but enough is preserved to show, under high magnification, that it is made up of spherical cells compactly arranged, as in the modern species, with no lacunae.

Horizon.—Miocene.

Collection and type.—Natural History Museum, South Kensington, London. Cat. No. V. 7944.

Collector.—Not known.

For the material I am indebted to Mr. W. N. Edwards, Keeper of the Geological Department, who very kindly allowed me to investigate the whole collection of *Palmoxyla* in his department.

THE USE OF PAPER AND CELLOPHANE DISCS FOR THE PREPARATION OF MUSEUM SPECIMENS OF MOULD CULTURES

By Alexander Fleming, F.R.C.S.

Some ten years ago I had the idea of growing bacteria on the surface of discs of paper or cellophane laid on the surface of a suitable culture medium. The nutrient material diffuses through the disc and supports growth of the organism on the surface. After incubation the disc can be lifted off, carrying with it the culture, sterilized by formalin, mounted on a suitable card or other material, and preserved as a record. Most bacteria, however, form semitransparent colonies which do not show up well with this method, but there are some which produce bright pigments which can well be demonstrated in this way and with which many interesting experiments can be done. The first exhibit is a permanent record made in this way of the method by which we can infect each other by infected droplets expelled from the mouth by talking, shouting, coughing or the like. I washed my mouth with a culture of *Bacillus prodigiosus* (a bacillus which is harmless but which grows in a bright red colony) and then talked for one minute in front of a culture plate covered with a disc of white paper. The plate was incubated and the colonies of *B. prodigiosus* grew out as bright red spots on the paper disc, which was removed, formalized and mounted. This actual culture, which was made seven or eight years ago, is much more effective for teaching purposes than any drawing or photograph.

Many designs may be made in this way with coloured bacteria grown on paper discs, which may be white or coloured.

Cellophane discs may also be used for bacterial growth, as the nutrient substances readily diffuse through cellophane, but the colours are not so effective and there is greater difficulty in mounting the specimens. Cellophane discs, in respect of bacteria, are especially useful for the demonstration of the flagella of motile bacteria. The bacteria are grown on the cellophane disc, which is removed and placed in another dish containing some water. This is placed in the incubator and the bacteria swim off the disc into the water. Then a few drops of formalin are added and then the bacteria are fixed, without disturbance, so that the very tender flagella are retained attached to the bacterial bodies.

I have applied this same paper or cellophane disc technique to the culture of moulds, and I think that it provides us with a means of studying the growth and structure of such organisms (this I am not going into at the moment) and of preserving cultures for museum purposes.

The disc is placed on a suitable solid culture medium and mould spores are planted in a single spot in the centre of the disc. Growth is permitted at a suitable temperature for a suitable time, and then the disc is removed with the mould colony and is floated on formalin solution in a closed vessel to kill the mould. Later the disc is mounted on a card or on glass and a suitable protective glass covering is applied.

If paper is used it must be of a certain closeness of texture, otherwise the mould grows through it and adheres so closely to the underlying medium that the colony cannot be removed without hopelessly tearing the paper disc.

For white paper I have found a good thin notepaper very suitable, and for black paper I have generally used a cheap dull black paper with a white reverse which we have used for covering benches for special demonstrations. Black paper in most cases shows up mould colonies better than does white.

Many methods may be used for mounting the discs surmounted with mould colonies. They may be stuck down on stiff card, or on glass sheets, and covered with any suitable glass covering, but I have found it very convenient to stick them down on a flat spectacle lens blank (a glass disc about 2 in. in diameter). The colony is then allowed to dry completely and then a torric lens blank is placed over it and the two lens blanks are bound together with a strip of ordinary surgical strapping.

If in any circumstance it is considered undesirable to dry the colony the paper can be stuck on the flat glass, then covered with the curved glass, and the strapping is applied to keep them in contact. Next the strapping is turned back for about half an inch, and with the point of a knife the two glasses are prized apart for about 2 mm. Through this hole the cell is filled with a mixture of equal parts of glycerine and 4 per cent agar which has been liquefied by heat. The glasses are now pressed together and the strapping refixed. After the agar is set the cell must be made airtight with sealing wax or some other material.

It is well known that the appearance of a mould colony varies enormously with the culture medium on which it is grown. This difference is manifest when the mould is grown on paper discs on different media, but the paper also contributes to the difference.

The disc may be made of cellophane, which has many advantages. This can be treated in the same way as the paper disc, but it also furnishes a means of obtaining a mould colony with no substratum, for some moulds when grown on cellophane float off when the disc is placed in water or in formalin fixing solution. The naked colony can then be floated on to a glass slide and mounted.

In conclusion, I suggest that cultures of moulds grown on paper or cellophane discs and mounted in a suitable manner are imminently suitable for the preparation of permanent museum specimens of these organisms.

Discussion.—

Professor Brooks considered that the method of preserving fungus cultures described by Professor Fleming was very promising. Hitherto, at Cambridge, Petri-dish cultures had been preserved by adding a little formalin and sealing the dishes with paraffin-wax, but this method was inconvenient in certain respects.

REMARKS ON VARIATION AND CHANGES IN THE APPEARANCE OF MOULDS.

By E. W. Mason.

A short time ago, Professor Fleming kindly demonstrated to me his disc method of making permanent mounts of mould colonies in culture; and, as imitation is the sincerest form of flattery, I first show a

variation of it designed by my colleague, Major Dade. In order to illustrate the uses to which this method can be put, I present a number of subcultures showing the various types of change displayed by moulds in artificial culture: e.g. change normal to each subculture and due to the ageing of the conidial turf (*Aspergillus fumigatus*) and change when growth is dominated by the conidial and by the perithecial condition respectively (*A. variicolor*). Of two isolates of *A. flavus*, each of several years standing, one is still showing the yellow green of full conidial production: the other only the white floccose mycelium associated with the suppressed conidial production. Three subcultures of the same isolate of *Stachybotrys atra* show the following characters: the first is completely blackened by the conidiophores and conidia: in the second, the black covering is overgrown by limited patches of white sterile mycelium; and the third, derived by subculturing from one of the overgrowths, shows only white sterile floccose mycelium. In contrast, *Aspergillus Wentii* and *A. itaconicus* represent species that produce their conidiophores normally on white floccose mycelium. Finally, a dried culture, mounted as a lantern-slide, shows a fast-growing *Stemphylium* saltating from a slower growing *Alternaria*, which it has completely surrounded.

The suggestion is made that the Fleming disc method of growing moulds for permanent preparations should prove useful in preserving the various fugitive facies of ageing subcultures: and especially so if used to record permanently the macro- and microscopic characters of freshly isolated type cultures: for, like the isolate of *A. flavus* that has become sterile, many type cultures outlive their usefulness. A mount, suitable for such recording purposes, is shown.

This passing of many isolates in artificial culture from a freely sporing to a sterile condition is insufficiently understood: and this understanding must, to some extent, be bound up with our conception of the individuals of which mould species are supposed to be composed. If all the subcultures of an isolate may properly be considered one individual, the present condition of the sterile *A. flavus* may represent the senescence of an individual: but there is more in it than that, for in many species Hansen's 'dual phenomenon' must be considered established. By originating 20 single spore subcultures, he showed that a single isolate can be separated into three distinct strains: (1) a stable mycelial or M-strain that produces few or no conidia; (2) a stable conidial or C-strain with profuse conidial production: and (3) intermediate MC-strains composed of admixtures of the first two.

Whatever, then, we take for an individual, either each isolate or each and every colony, each individual can possess more than one individuality. These individualities normally find expression in the production of a macroscopically, at any rate, not inharmonious whole: but on occasion, as in the *Stemphylium-Alternaria* isolate, they may find expression in originating two distinct and openly competing growths.

The cultures and preparations shown were kindly loaned at very short notice by my colleagues at the Imperial Mycological Institute: *Stemphylium-Alternaria* by the Director, Dr. S. P. Wiltshire, *Aspergillus* by Major H. A. Dade, and *Stachybotrys* by Dr. G. R. Bisby.

ORTHOPTERA OF THE SIWA OASES.

By B. P. Uvarov, D.Sc., F.L.S.,
British Museum (Natural History).

[Plate I and 5 Text-figures.]

The Armstrong College Expedition to the oases of Siwa, Egypt, consisting of Dr. J. Omer-Cooper, Dr. Malcolm Cameron and Mr. C. L. Smith, spent about six months (March–October, 1935) in the field and brought home extensive collections of insects. Unfortunately, a portion of the Orthoptera material was not available for my study: but 644 specimens, belonging to 35 species, which have been worked out in detail, represent a solid basis for a study of such a limited fauna.

The types of the new species are in the British Museum (Natural History), where the bulk of the material is preserved.

Notes on the localities. A short report of the Expedition has been published by Dr. Omer-Cooper ('Nature', CXL, pp. 919–920; 1937), and the following notes, referring only to the localities from which Orthoptera were available, have been extracted from a list prepared by him for the specialists working on the collections.

Siwa depression.—Lat. 29° 4′–29° 20′ N., Long. 25° 17′–26° 6′ E. A fairly large depression, about 50 miles long and 18 miles wide at its greatest width. It is slightly below sea-level. On the north and west it is bounded by limestone cliffs and on the south by the dunes. The greater part of the depression is almost level and the earth heavily charged with salt. There are regions where stunted reeds and rushes grow with a few dwarf palms, but the greater part of the area is almost sterile. On the edge of the sand in the south there is a fair amount of desert vegetation, and in one small region near Khamissa there are poplars, *Populus euphratica* Oliv., while in the east, on the Gara road, there are a few small Acacia trees.

The oases of the depression are Zeitoun, Abu Sheruf, Koreishid, Siwa, Khamissa and Maragi.

Siwa, the largest village in the depression, is surrounded by very numerous gardens, some of which are continent, but many form small oases surrounded by barren salt pans. The gardens contain great numbers of date palms, with olive, apricot, pomegranate, fig and many other fruit trees, vines, vegetables and barley fields. There is *berseem* (lucerne, *Medicago sativa* Linn.) in the great majority of the gardens. Reeds and rushes are not as plentiful as they are in the less cared for oases, but there are a good many tamarisks, *Tamarix mannifera* Ehrb.

Zegawa, a large garden somewhat isolated, but close to the other gardens of Siwa, and included with them under the general heading of Siwa.

Tagzerti (Tazzertia on the labels of specimens), Lat. 29° 11′, Long. 25° 29′. Siwa, large pipe well.

Redunkalil Tutnatee (= Ain Khalil = Hatyet Tanati), Lat. 29° 11′, Long. 25° 34′. Siwa, near Gebel Takrur.

Zeitoun, Lat. 29° 10′, Long. 25° 47′. The largest cultivated area, watered by a single spring, in the Siwa depression. The flow of this

beautiful spring forms a good stream which waters the whole oasis. Olives are numerous and many fruits are grown. There is a fair amount of land, which is only partly cultivated, and reeds, rushes and various weeds, etc., are numerous.

KHAMISSA. Siwa depression, west of Birket Khamissa. Lat. 29° 11′. Long. 25° 25′. A few good gardens. The soil here is better than at Siwa. The springs have not been modernized and the gardens are less carefully cultivated. To the south of the oasis is a large marsh which proved a rich collecting ground. In the sands on the edge of the marsh are the poplar trees, *Populus euphratica*.

KOREISHID (=Qureishit). Siwa depression. Lat. 29° 12′. Long. 25° 48′. A saline spring forms a small uninhabited oasis which was once cultivated and contains date palms. There are quantities of reeds and rushes, some *Tamarix aucheri* and a climbing plant, *Cynanchum acutum* Linn., which has flowers with a sweet sickly scent which is very attractive to insects. There are large reed beds and areas of rushes extending for a considerable distance along the shores of the 'birket' salt lake. The shores of the lake are sandy in parts, and in parts of hard mud solidified by the crystallization of salts. At one time the reeds grew in the lake itself, as their stems can still be seen in the mud.

MARAGI. Siwa depression, west of Khamissa. Lat. 29° 15′. Long. 25° 21′. A few small gardens and a large area of marsh-land with a 'birket'. This oasis has not many inhabitants, and is badly cultivated. There are considerable areas of rushes.

The following two oases are outside the Siwa depression:—

JAGUB (=Gagub, Qsiqub) OASIS. Lat. 29° 34′–29° 40′. Long. 24° 51′–25° 0′. A depression with rushes and few palms: earth very saline.

GARA (=Qara) OASIS. Lat. 29° 36′–29° 39′. Long. 26° 29′–26° 31′. A small village, with several miserable gardens, in the Qattara depression.

The Siwa fauna compared with that of other Libyan oases and of the Nile valley.

The collection of Orthoptera made by the Expedition is of special interest because it represents the results of careful collecting in one group of oases throughout a period of nearly six months, and differs in this respect from the more or less casual material taken by travellers. It should be expected, therefore, to present a fairly complete picture of the fauna. Unfortunately, it is difficult to estimate the real number of species that may be found in an isolated group of oases in the Libyan desert, since no other group is sufficiently explored. It will be seen, however, from the table on page 16, that the total of 32 species recorded from Siwa compares favourably with 25 from the Giarabub group and with 14 from the Gialo, both in Italian Libya and at approximately the same latitude as the Siwa group. Nevertheless, the absence from our list of some species is almost certainly due to the incompleteness of our records. For example, there can be scarcely any doubt that *Blepharopsis mendica* F., a Mantid very widely spread in desert oases of North Africa and Arabia, should occur in Siwa, while 1–2 species of *Empusa* and *Hypsicorypha* should also be expected. Among Blattidae, the number of Polyphaginae is probably greater than the two species hitherto recorded.

and the same can be said with regard to Gryllidae, which are not easy to collect. In Tettigoniidae, in addition to the single undetermined *Conocephalus* sp. at least one or two other representatives should be expected, e.g. *Phaneroptera albida* Wlk., and perhaps *Homorocoryphus nitidulus* Scop. The list of Acrididae is probably fairly complete (apart from purely desert-icolous species, not considered here), but one may expect 1 or 2 additional species such as *Platypterna* spp., *Aiolopus thalassinus* F., etc. Considering also that specialized collecting may possibly bring to light some rarer and less conspicuous species, it appears justifiable to estimate the total Siwa fauna of Orthoptera at approximately 45 species, so that the 32 species known at present would constitute a percentage sufficiently high to be used as a basis for discussing the fauna.

First of all, it must be pointed out that the aim of the Expedition has been to study the oasis fauna proper, and, therefore, apparently less attention had been paid to collecting in habitats of the desert type. The collection studied by me contains only a few forms that belong to the desert, such as *Sphingonotus rubescens* and *Eremiaphila rotundipennis*, and although notes on them will be found in the systematic part, they are omitted from the list on page 16, which is a list of the oasis fauna proper.

The interest of the oasis fauna of Siwa is due to its being almost completely isolated from other ecologically similar faunas by wide expanses of desert unsuitable for the habitation of most of the oasis species. It appears, therefore, of interest to compare the Siwa fauna with that of other oases. From the table on page 16 it will be seen that 14 of the Siwa species are not recorded from the Giarabub oases about 100 km. NW. of Siwa, and as many as 20 are not known from the Gialo (about 500 km. W. of Siwa). It would be, however, completely unjustifiable to regard these figures as indicating real differences between the faunas. The large number of species known from Siwa, but not from Giarabub, must be mainly due to our very incomplete knowledge of the Giarabub fauna, which has never been as systematically explored as Siwa has. A further cause of the apparent differences between the two faunas may be in the specific determinations in such difficult genera as *Platypterna*, *Duroniella*, *Pyrgomorpha*, *Heteroxamodes*, etc., where the same species may have been recorded under various names by different authors. In any case, it appears unjustifiable to regard the species at present known only from Siwa and not from Giarabub as definitely not occurring in the latter group of oases. Exception may possibly be made for a new Siwan species, *Duroniella cooperi*, but it is described in this paper for the first time, and it would be premature to regard it as a true endemic.

The Gialo group of oases is much more distant from Siwa than the Giarabub, but it would be incorrect to regard this as the reason for the relatively low number of species known from the Gialo as compared with the Siwa oases. There is no doubt that our knowledge of the Gialo fauna is quite fragmentary, and no reliance can be placed on the negative evidence with regard to it.

On the other hand, it is of interest to analyse more closely the possible reasons for the absence from the Siwa list of the species known either from other Libyan oases or from the Nile valley. In the Gialo group there are only three species (two *Heteroxamodes* spp. and *Hypsicorypha gracilis*)

which are not recorded from Siwa, but since they are all known from the Nile valley as well, their real absence from Siwa requires confirmation. Similarly, the Giarabub fauna includes 9 species not known from Siwa; but all of them, except one, occur in the Nile valley, and, therefore, may be expected to occur in Siwa as well. The only Giarabub species not recorded either from Siwa or from the Nile valley is *Platypterna lybica*, but the species is known to me from the Sudan, and in any case no great reliance can be placed on specific records in this difficult genus. Moreover, species of *Platypterna* are not restricted to oases, since they are able to live in the open desert, provided there are some tussock grasses (*Aristida*).

Now as regards the positive difference of the Siwa fauna from that of the Nile valley, it is expressed by six Siwa species not known from the Nile, as follows:—

Theganopteryx sp., *Eugryllodes kerkennensis*,
Elaea gestroi, *Platypterna geniculata*,
Gryllulus palmetorum, *Duroniella cooperi*.

It is impossible to attribute great importance to the small Blattid *Theganopteryx* sp., since the Blattid fauna of Egypt remains very little known. The Mantid *Elaea gestroi* has been only recently separated from *E. marchali*, a species widely distributed in the Sudanese zone of Africa from the Red Sea coast to Senegal and penetrating into Upper Egypt; no member of this genus, however, has yet been recorded from the lower Nile valley, and its absence from there is probably real, since the males, at least, are attracted to light and should not have escaped the attention of collectors. We may, therefore, suggest that the presence of *Elaea* in Siwa and in other Libyan oases is a definite positive difference of their fauna from that of the Nile valley. The implications of this fact will be discussed below.

Of the two Gryllids in the above list, one, *Eugryllodes kerkennensis*, is so widely distributed in the Eremian region (from Southern Spain and Algeria to Central Asia) that its absence from the Egyptian list must certainly be regarded as accidental, being due probably to the concealed habits of the insect which is not easily found even when it is numerous, as can be judged from the peculiar stridulation of the male. As regards *Gryllulus palmetorum*, this is a very little known species, recorded from the Algerian Sahara, Siwa and tropical Africa (see under this species in the systematic part of the present paper), and no reliance can be placed on its absence from Egypt, which may be only an apparent one.

Of the two Acridids in the list, the absence of *Platypterna geniculata* from Egypt has yet to be proved, while, as explained below, I cannot be quite certain in my determination of the Siwa material. On the other hand, there are good reasons to think that *Duroniella cooperi* actually does not occur in Egypt, as it is a very distinctive species, and I have not seen anything similar to it among Egyptian specimens of *Duroniella*, which all appear to belong to *D. lucasi*.

Of course, it would not be difficult to draw up a fairly long list of species known from the Nile valley but not found in Siwa, but the biogeographical value of such a list would be limited, since the fauna of Egypt has been under study for a very long time, partly by resident

collectors, and this alone makes it incomparable with the less known Siwa fauna.

Biogeographical analysis of the Siwa fauna.

As stressed by me elsewhere (Uvarov, 'Ecological and biogeographical relations of Eremian Acrididae'. Soc. de Biogéogr., VI. pp. 231–73; 1938), biogeographical analysis of a fauna can be best carried out on an ecological basis, that is by first dividing the fauna into particular ecofaunae and then analysing each ecofauna separately from the point of view of its affinities. Unfortunately, no ecological data were provided on the labels of the specimens as they reached me, and the following classification is based on the general knowledge of the habits of each species :—

A. *Graminicolous ecofauna*. To this group are referred the species living mostly on, or among, graminaceous plants, whether xerophilous tussock-grasses or hygrophilous reeds. Here belongs the only Tettigoniid recorded from Siwa, *Conocephalus* sp., one of the Mantids, *Oxyothespis* sp., as well as the following Acrididæ :

Acridella nasuta,
Platypterna geniculata,
Duroniella cooperi,
Aiolopus strepens,
Pyrgomorpha cognata,
Tropidopola longicornis.

This makes altogether eight graminicolous species. Out of this number, *Conocephalus*, *Oxyothespis*, *Acridella*, *Aiolopus*, *Pyrgomorpha* and *Tropidopola* are members of genera with clearly expressed tropical distribution, and have to be regarded as of tropical Ethiopian origin. Amongst the remaining two species, *Platypterna geniculata* belongs to a typically Eremian genus, which, however, has very clear affinities with a group of genera best developed in the African dry tropical grasslands. As regards *Duroniella cooperi*, it is an endemic species of Siwa, but the genus is purely Eremian in distribution, while restricted to the northern fringe of the Eremian zone, bordering on the Mediterranean countries : it should be classified, however, as a Mediterranean element, as it could not have been derived from an Ethiopian stock.

We have, therefore, seven graminicolous species that are Ethiopian in origin, and one Mediterranean.

B. *Arbusticolous ecofauna*. The species living on shrubs and trees include all the Mantids (except *Oxyothespis* : see above), which are four in number, *Oecanthus turanicus*, *Eyprepocnemis*, *Thisoicetrus* (two species), *Anacridium* and *Schistocerca*, altogether 10 species. Out of this number, one species only, *Iris oratoria*, can be considered as Mediterranean (although represented by an African subspecies), while all the others belong again to the genera of unquestionable Ethiopian origin.

C. *Detriticolous ecofauna*. This group comprises insects living in vegetable debris, under stones, etc., and mostly nocturnal in habits. Here belong all cockroaches (four species), *Pteronemobius gracilis*, and three species of *Gryllulus*. The origin of these species is not easy to establish, but *Shelfordella*, *Heterogamodes* and *Pteronemobius* appear to belong to the Eremian stock, while the other five are Ethiopian.

D. *Terricolous ecofauna*. This somewhat artificial assemblage includes two species living on more or less bare soil surface, *Acrotylus* and *Paratettix*, and four burrowing in the soil, or hiding in its cracks, such as

Gryllotalpa (two species), *Gryllus bimaculatus* and *Eugryllodes*. The origin of the group is a mixed one, since *Acrotylus*, *Paratettix* and *Gryllotalpa gryllotalpa* can be regarded as Mediterranean species, while *Eugryllodes* is Eremian, and *Gryllus bimaculatus* and *Gryllotalpa africana* are clearly tropical (or Ethiopian).

To summarize, the predominance of Ethiopian elements in all ecofaunas is very striking, not less than 23 species out of the total of 32 being of definite Ethiopian origin, as against five Mediterranean and four Eremian ones.

Origin of the Siwa fauna.

The biogeographical analysis presented above supplies convincing evidence that the Siwa oases received their fauna almost entirely from the south, from tropical Africa, while only very few of its components can be regarded as immigrants from the Mediterranean countries in the north. The ecological requirements of most Orthoptera of oases are such that their spread over wide expanses of pure desert appears now practically impossible, which leads us to the inevitable conclusion that they must have spread when the climatic conditions over the present deserts were substantially different and resembled those now observed in tropical Africa. This might have been possible during the Pleistocene pluvial periods, when more abundant precipitation over northern Africa would have permitted a northward expansion of tropical savannas with their typical fauna, relics of which are now forming the bulk of the population of desert oases, the only 'ecological islands' where their survival during subsequent dry periods was possible.

It will be seen that this view (already expressed by me: see Uvarov, op. cit.) is diametrically opposed to that held by some recent biogeographers (Hutchinson, 'The zoo-geography of the African aquatic Hemiptera in relation to past climatic change', Intern. Rev. ges. Hydrobiol. Hydrogr., XXVIII, pp. 436–68; 1933, and Jeannel, 'Coleoptera. I. Carabidae: Trechinae et Perigoninae', Mission Scient. de l'Omo, II, p. 27; 1935), who believe in a southward migration of northern elements during the pluvial periods, bringing them into tropical Africa. Should this have been the case, then the oases lying near the northern edge of the desert zone should certainly have harboured some clearly northern relics instead of a few Mediterranean elements amongst a wholly tropical fauna. It should be noted in this connection that the Pleistocene flora of the Kharga oasis was found to be 'typically African' by Gardner ('The Pleistocene fauna and flora of Kharga oasis, Egypt', Quart. Journ. Geol. Soc. Lond., XCI, pp. 479–518; 1935), who proved that an earlier Kharga record of the fossil Mediterranean *Quercus Ilex* was due to an incorrect identification. This record used to be one of the strongest arguments in favour of the southward spread of 'Palaearctic' elements during Pleistocene pluvials. Another argument of a similar kind was seen in the occurrence in the highlands of Abyssinia of a water-bug, *Glaenocorixa hugoscotti* Hutch., other members of the genus being Holarctic in their distribution (see Hutchinson, loc. cit.). However, Jaczewski in a recent paper ('*Pseudoglaenocorisa*, a new genus for an aberrant species of Corixidae from Africa',

Ann. Mus. Zool. Polon., XIII, pp. 276–81; 1939) has shown that this species should be removed from *Glaenocorixa* into a new genus *Pseudoglaenocorisa*, and concluded that 'it seems to be somewhat premature to consider *P. hugoscotti* (Hutch.) to be a close relative of some distinctly Holarctic groups of Corixidæ, and to base upon such a supposed relation any zoogeographical conclusions'.

While, therefore, the northward spread of tropical fauna in the pluvial periods appears clearly established, it is of interest to note that there are signs of some differences in the history of tropical elements in the Libyan oases on the one hand and in the Nile valley on the other.

An interesting case is that of the Mantid *Elaea*, which is common in Libyan oases but absent from the lower Nile valley, although occurring in Abyssinia and the Sudan. Since its female is flightless, and dispersal of the species across desert is excluded, it must have reached the Libyan oases by gradual dispersal from the south. A similar example is offered by *Thisoicetrus harterti*, which is distributed across tropical Africa from the Sudan to Senegal, with 'insular' occurrences in the Algerian oases and in the Gialo oases of Libya, while it is almost certainly absent from the Nile valley in Egypt, where such a conspicuous insect could not have been overlooked by collectors.

These examples suggest that some tropical elements were able to reach oases in the northern Sahara and Libya while they failed to spread northward along the Nile valley. The reason for this failure may be an ecological one, since the spread of the tropical savanna elements would be possible only if the Nile valley were sufficiently wide and carried a savanna flora. It appears probable that in the earlier stages of its development the Nile in its lower course flowed in a narrow canyon between desert banks. Such conditions would preclude the northward migration of savanna elements such as *Elaea* and *Thisoicetrus*, but not of the species living near water. An excellent example of faunistic elements of the latter kind is offered by the Acridid genus *Chrotogonus*, which is purely tropical in its distribution, but with several species known from the lower Nile valley, while none occur in the Libyan and Saharan oases. The explanation is that *Chrotogonus* lives on bare sand very near water, and its spread down the Nile must have been due to passive transport, particularly during floods. This phenomenon is, of course, entirely distinct from the gradual northward dispersal of purely terrestrial tropical elements, of which we have no reliable evidence with regard to the Nile valley.

The so-called Mediterranean elements in the Siwa are, as shown above, surprisingly few in number, five out of the total thirty-two species. Their exact status, however, requires further analysis. Two of them, *Acrotylus insubricus* and *Paratettix meridionalis*, may be called Mediterranean species, but they belong to genera of most pronounced tropical distribution, and are merely their extra-tropical representatives. Two others, *Gryllotalpa gryllotalpa* and *Iris oratoria*, are also members of essentially tropical groups. *Iris oratoria*, moreover, is represented in Siwa by an African, and not a Mediterranean, subspecies.

The history of these elements is not clear at present, but it appears possible to advance a theory that they may be relics of a pre-Pleistocene south European fauna which was probably somewhat tropical in its

character. The glacial periods of the Pleistocene resulted in the extermination of this fauna in its more northern areas, with a few relics surviving in the more sheltered areas of the Mediterranean region. Hence their present Mediterranean type of distribution, combined with an obvious affinity with African continents. Viewed in that light, even these Mediterranean species do not come within the category of faunal elements forced southwards during the glacial phases of the Pleistocene.

The only species of Siwa that has no claim to affinities with tropical African forms is *Daroniella* sp. ind. Members of this genus are found scattered over the narrow zone of contact between the Mediterranean hilly lands and the Eremian region. The affinities of the genus suggest its great age, as evidenced by some relation to certain genera of south-western North America. For the purpose of the present analysis, *Daroniella* may be correctly classified as Mediterranean, but its occurrence in the northern zone of deserts is perfectly natural and there is no need to invoke a southward migration to explain its presence in Siwa.

Systematic list.

BLATTIDAE.

THEGANOPTERYX sp. Khamissa, 29. vi, 1 specimen.

A single specimen, with the end of abdomen damaged so that it is impossible to determine the species and the sex.

The genus has yet not been recorded from Egypt. It includes a number of species distributed in the tropics of the Old World, including tropical Africa.

BLATTA ORIENTALIS Linnaeus, 1758. Siwa, 29. iv, 1 ♂.

According to Dr. Omer-Cooper, the specimen was taken not in a house, but outside.

SHELFORDELLA TARTARA (Saussure, 1874).—1874. *Periplaneta tartara*, Saussure, Voyage Turkestan Fedtchenko, Orthoptera, p. 9.—1910. *Shelfordella tartara*, Adelung, Horae Soc. Entom. Ross., XXXIX, p. 311, pl. xv, fig. 1. Siwa, 22. vi, 8. viii, 10. ix.

Originally described from Turkestan, this cockroach is now known also from Mesopotamia, Arabia (British Museum), Egypt (Assuan, Werner, 1905; Meadi and Kharga, Uvarov, 1924), Libya (Gharaiub, Salfi, 1927; Giofra, Capra, 1929), and Sudan (Khartoum, Uvarov, 1924).

HETEROGAMODES ZAVATTARII Salfi, 1935.—1935. *Heterogamodes zavattarii*, Salfi, Boll. Soc. Entom. Ital. LXVII, p. 121, fig. 1. Khamissa, 3. ix; Maragi, 26. viii; Siwa depression, Zeitoun, 2. ix; Siwa, 16. viii, 27. viii (larva).

Described recently from the Gialo oasis in Libya and not yet recorded from elsewhere.

MANTIDAE.

EREMIAPHILA ROTUNDIPENNIS Kirby, 1904.—1871. *Eremiaphila typhon* var., Saussure, Mem. Soc. Phys. Hist. Nat. Genève, XXI, p. 248.—1889. *Eremiaphila typhon*, Westwood, Revis. Mant., p. 28, pl. 14, fig. 11 (*nec* Lefebvre ?).—1904. *Eremiaphila rotundipennis*, Kirby, Syn. Cat. Orth.

Table of Orthoptera of Libyan oases.

Note.—Only the species ecologically connected with oasis habitats are included, those of desert habitats being omitted. The list for the Nile valley is not complete, the column showing only the occurrence there of the species recorded from Libyan oases. The data for Gialo and Giarabub are mainly from Zavattari ('Prodromo della fauna della Libia', Pavia; 1934), supplemented by later records.

	Gialo.	Giarabub.	Siwa.	Nile valley.
Blattidae.				
Theganopteryx sp.			+	
Blatta orientalis	+		+	+
Periplaneta americana	+	+		+
Shelfordella tartara		+	+	+
Heterogamodes ursina	+	+		+
,, cerverae	+	+		+
,, zavattarii			+	
Mantidae.				
Elaea gestroi	+	+	+	
Oxyothespis sp.			+	+
Iris oratoria coeca			+	+
Sphodromantis viridis			+	+
Mantis religiosa			+	+
Rivetina baetica		+		+
Hypsicorypha gracilis	+			+
Blepharopsis mendica	+	+		+
Gryllidae.				
Oecanthus turanicus			+	+
Pteronemobius gracilis			+	+
Gryllus bimaculatus	+	+	+	+
Gryllulus domesticus	+	+	+	+
,, bordigalensis		+	+	+
,, palmetorum			+	
Eugryllodes kerkennensis			+	
Tettigoniidae.				
Conocephalus sp.			+	+
Gryllotalpidae.				
Gryllotalpa gryllotalpa		+	+	+
,, africana		+	+	+
Acrididae.				
Acridella nasuta	+	+	+	+
Platypterna lybica		+		
,, geniculata			+	
,, rothschildi		+		+
Duroniella lucasi		+		+
,, cooperi			+	
Aiolopus strepens	+		+	+
Acrotylus insubricus inficitus	+	+	+	+
Pyrgomorpha conica		+		+
,, cognata		+	+	+
Tropidopola longicornis longicornis		+	+	+
Eyprepocnemis sp.			+	+
Thisoicetrus annulosus		+	+	+
,, harterti	+			
,, littoralis similis		+	+	+
Anacridium aegyptium		+	+	+
Schistocerca gregaria	+	+	+	+
Tetrigidae.				
Paratettix meridionalis		+	+	+
Total number of species	14	25	32	34

I, p. 210.—1927. *Eremiaphila rotundipennis*, Giglio Tos, Das Tierreich, 50 Lief., Mantidae, pp. 45, 47.—1929. *Eremiaphila rotundipennis*, Capra, Ann. Mus. Civico Genova, LIII, p. 126. Jagub, 18. viii, 1 ♀.

The confusion that arose round *Eremiaphila typhon* Lef. and *E. rotundipennis* Kirby is not very easily cleared. To begin with, Lefebvre's original description of *E. typhon* was based on an immature specimen, in which the essential character separating *typhon* from *rotundipennis*, namely the coloration of elytra and wings, is not developed. We have, therefore, to take Saussure's re-description of *typhon* based on the adult as actually referring to this species. To this description Saussure has added a short diagnosis of a variety differing by the presence of metallic-black bands on elytra, without giving it a name. Westwood has described and figured the same banded form under the name *E. typhon*, quoting a specimen in the British Museum. Kirby in 1902 has proposed for this insect the name *E. rotundipennis*, which is a manuscript name by Bates appended to the specimen studied by Westwood. This specimen, therefore, is the type of *E. rotundipennis* Kirby. Giglio Tos recognized the latter as a valid species, but indicated its differences from *E. typhon* incorrectly, when he stated that *E. rotundipennis* differs by smoother elytra, which is not the case, and by an apical fascia on the underside of elytra, without mentioning a similar fascia on the wings. Capra's notes on the differences between *E. typhon* and *E. rotundipennis* are correct as regards the coloration of elytra and wings, but other characters mentioned by him do not seem to have diagnostic value. It was for this reason that Salfi (Ann. Mus. Zool. Napoli, VI, no. 14, 1934, pp. 3–5, fig. 1) considered *E. rotundipennis* as a pure synonym of *E. typhon*, of which that author had seen some specimens with an indication of faint apical elytral fascia, and believed this character to be as variable as others.

I have before me six specimens of *E. typhon* from the Libyan desert and five of *E. rotundipennis*. The elytra in *E. typhon* usually have a darker brown marginal fascia on the underside, and so have the wings, but this pattern is quite distinct from the metallic-black fasciae in *E. rotundipennis*, in which the elytra often (though not always) have a second, pre-apical, narrow fascia of the same colour. Although the series at my disposal are obviously insufficient for a definite conclusion, I consider it more correct to regard *E. typhon* and *E. rotundipennis* as distinct until the contrary opinion is proved.

A third species of this group is *E. gigas* Beier, described from the Sudan, and very doubtfully distinct from *E. typhon*.

ELAEA GESTROI Capra, 1929 (fig. 1, G).—1929. *Elaea gestroi*, Capra, Ann. Mus. Civ. Genova, LIII, p. 128, figs, 1, 2, 3. Siwa, 20. iv, 22. iv, 23. vi, 30. vi, 12. vii, 4. viii, 8. viii; Khamissa, 22. vi: Koreishid, 20. vi, 22. viii; Jagub, 18–19. viii.

This species has been described from a female taken at the Giarabub oasis, and it is unfortunate that the present series, although fairly long, consists of males only. I believe, however, that I am correct in my determination, since the males before me differ from males of the Abyssinian *E. marchali* (R. and F.) in the same set of characters as indicated by Capra for the females. These differences are better shown by figures (see text-fig. 1, M and G) than by words, but they are clearly sufficient for

specific separation. In the coloration, *E. gestroi* is generally paler than *E. marchali*, varying from the practically uniform pale sandy colour, with scarcely perceptible darker elytral spots, to dark brown with distinctly marked elytra. The series of 19 males exhibits also a considerable variation in size, the smallest male measuring 27 mm. from the frons to the tip of elytra, while the largest reaches 33 mm. Both types of variation, in colour and in size, do not suggest any correlation with localities or dates, and should be regarded as purely individual.

The distribution of *E. gestroi* is very imperfectly known, since most of the earlier authors took for granted the existence of a single species of the genus, *E. marchali*, until Capra distinguished *E. gestroi*. It is not possible therefore, without re-examining original specimens, to refer old records of *E. marchali* to a definite species. As far as can be judged from the limited sufficiently reliable evidence, *E. marchali*, originally described from Abyssinia, occurs also in Somaliland, the drier parts of Kenya, Uganda, the Sudan, Nigeria and apparently Senegal: it is also recorded, from Hoggar, Tibesti and Fezzan, but these records require critical corroboration.

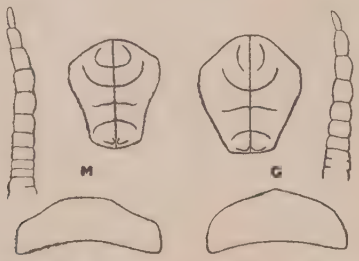


FIG. 1.—M, *Elaea marchali* (R. & F.), ♂, cercus, pronotum and facial shield, G, *Elaea gestroi* Capra, ♂, same parts.

E. gestroi is known from the following localities, apart from the present records: Capra (loc. cit.) described it from the Giarabub oasis, and referred to it Salfi's records (Boll. Soc. Nat. Napoli, XXXIX, 1929, p. 297) of *E. marchali* from the same oasis, and Werner's records (Zool. Jahrb. Syst., XXVII, 1908, p. 91), also under the latter name, from the Gialo oasis. Salfi (Ann. Mus. Zool. Napoli, 6, no. 14, p. 5) recorded *E. gestroi* from the Cufra (Kufra) and the Auenat (Awenat) oases. It would appear that *E. gestroi* is restricted to a few oases of Central Libya, but further exploration may show it more widely spread than the few present records show.

OXYOTHESPIS sp. Siwa, 9. vii, 1 ♂; Khamissa, 29. vi, 1 ♀ larva.

In the key to species of *Oxyothespis* by Giglio-Tos (Das Tierreich, Mantidæ, p. 286), the Siwa male may be run down to *O. nilotica* Giglio-Tos, and would be determined as such from the original description as well. However, a direct comparison with the type of *O. nilotica* reveals a considerable difference in the shape of the ocular spine which cannot be disregarded, and is certainly more important than the colour characters on which the key is based. Since the majority of species in this genus are very imperfectly described, it would be useless to attempt a specific determination.

Iris oratoria coeca Uvarov, 1931 (Plate 1, figs. A, B & C).—1931. *Iris oratoria coeca*, Uvarov, Ann. Mag. Nat. Hist. ser. 10, viii, p. 235, pl. vi, fig. 2. Siwa, 3. viii, 1 ♂; 4. ix, 1 ♂; 21. viii, 1 ♀; Gara, 4. vii, 1 ♂.

The four specimens before me cannot be referred to the typical subsp. *oratoria* (L.) occurring in the Mediterranean countries, which is characterized by the large central spot of the hind wings. In the subsp. *coeca* Uv., described from the Anglo-Egyptian Sudan, and known to me also from Arabia, this spot disappears and the pattern of hind wing is represented only by partly anastomosing concentric fasciae. The three males of the Siwa form have a very small central spot, and in this respect may be regarded to represent a transition from the Mediterranean subsp. *oratoria* to the Sudano-Arabian subsp. *coeca*, but definitely closer to the latter. Another character mentioned by me in the original description of subsp. *coeca* is the black markings on the anterior femoral spines, but this does not appear of significance, as the coloration of the spines is subject to variation in Mediterranean specimens, which should be referred to subsp. *oratoria* by their wing pattern.

The Siwa males are slightly smaller than the type of subsp. *coeca*, but agree in this respect with Arabian specimens.

The female of subsp. *coeca* has not yet been known. The female from Siwa can scarcely be regarded as a typical representative of the subspecies since the males are not, and I therefore do not think it necessary to give its description, the more so that the figures (Plate 1) give a clear idea of the main character, namely, the reduction in size of the central wing spot.

The species *I. oratoria* has not yet been recorded from any of the Libyan oases, but is known to occur in the coastal areas of Cyrenaica and Tripolitania, as well as in the Nile valley. The subspecies occurring in the two former countries is not known, but is probably *I. oratoria oratoria* As for the Nile valley, I have before me two females only. One of them, from Mohammedia, has the central wing spot of the size which refers it to subsp. *oratoria*, but in another female labelled 'Meadi' the spot is considerably reduced, although larger than in the Siwa female. Unfortunately, no males from the Nile valley are available for comparison, but it appears that a tendency towards a reduction of the wing spot exists in that area as well. I would add that the spot is generally somewhat smaller in eastern Mediterranean specimens as compared with the western ones, without being reduced to the size observed in the Siwa specimens.

Sphodromantis viridis (Forskål, 1775). Siwa, 18–29. iv, 15. vii, 1–12. viii, 8. ix; Siwa depression, Zeitoun, 29. viii.

The commonest Mantid of North African oases.

Mantis religiosa (Linnaeus, 1758). Siwa, 1. viii, 1 ♀; Khamissa, 22. vi, 1 ♂; Koreishid, 30. vi, 1 ♂, 1 ♀; Gara, 4. vii, 1 larva.

Southern Europe; whole of Africa, Asia, Australia.

GRYLLIDAE.

Oecanthus turanicus Uvarov, 1912.—1912. *Oecanthus pellucens turanicus*, Uvarov, Horae Soc. Entom. Ross., xl, no. 3, p. 38.—1915. *Oecanthus turanicus*, Semenov-Tjan-Shansky, Rev. Russe Entom., xv, p. 452.—1924. *Oecanthus turanicus*, Uvarov, Bull. Ministry Agr. Egypt, no. 41, p. 14, pl. ii, fig. 17. Siwa, 4. vii, 2 larvae; 10. vii, 1 larva; 22. vii, 1 ♀.

The single female and the larvae before me are referred to this species with some doubt, since *O. turanicus* is distinguished from *O. pellucens* mainly by the venation of the male elytra.

PTERONEMOBIUS GRACILIS (B. Jakovleff, 1871).—1871. *Gryllus gracilis*, B. Jakovleff, Horae Soc. Entom. Ross., VI, p. 20, pl. i, figs. 3, 3*a*.—1893. *Nemobius mayeti*, Ann. Soc. Entom. Fr. Bull. p. 252.—1912. *Nemobius adelungi*, Uvarov, Horae Soc. Entom. Ross., XL, p. 39.—1921 *Pteronemobius gracilis*, Chopard, Journ. Bombay Nat. Hist. Soc., XXVII, p. 57. Siwa, 1. ix, 1 ♀.

A common Eremian species, known to occur from Algeria to Turkestan.

GRYLLUS BIMACULATUS De Geer, 1773. Siwa, 10. ix, 1 ♀.

Black form, with pale basal elytral spots.

GRYLLULUS DOMESTICUS (Linnaeus, 1758).—1758. *Gryllus Acheta domesticus*, Linné, Syst. Nat., ed. X, i. p. 428.—1935. *Gryllulus domesticus*, Uvarov, Ann. Mag. Nat. Hist. ser. 10, XVI, p. 320. Siwa, 29–30. vi, 30. vi, 10–27. vii, 28. viii.

Most of the adult specimens of the house-cricket are of smaller dimensions than the European domestic form, which appears more similar in that respect to specimens from Arabia. An extensive biometrical study of wild populations of *G. domesticus* may probably throw some light on the original area of the domestic form that has been introduced into Europe from some part of the Eremian region where the species lives wild.

GRYLLULUS BORIGALENSIS (Latreille, 1804). Siwa, 1. viii, 1 ♀: 24. viii, 1 ♂.

GRYLLULUS PALMETORUM (Krauss, 1902).—1902. *Gryllus palmetorum*, Krauss, Verh. zool.-bot. Gesellsch. Wien, LII, p. 250, fig. 11. Siwa, 10. vii, 1 ♂, 1 larva; 7. viii, 1 ♀, 1 larva; 8. viii, 1 ♀.

This small cricket has been described from the Ngoussa, Touggourt and Mraier oases in the Algerian Sahara, but never recorded again until Chopard (Ark. Zool., 18 A, no. 30, 1926, p. 4) referred to it a male specimen from the Ruanda territory in Central Africa. In a subsequent publication (Ann. Mus. Congo Belge, Zool. IV, fasc. 1, 1934, p. 23), Chopard stated somewhat vaguely that *G. palmetorum* is common in south Algerian oases, and repeated his Ruanda record, but in a less definite form ('Elle est commune dans les oases sud-algériennes et semble s'avancer plus au Sud, car j'ai cru pouvoir y rapporter un individu provenant du Ruanda').

The identity of the Siwa specimens is beyond doubt, as the peculiar loose venation of the lateral elytral field supplies an excellent character, and the specimens agree with the original description in every other detail.

EUGRYLLODES KERKENNENSIS (Finot, 1893).—1893. *Gryllodes kerkennensis*, Finot, Bull. Soc. Entom. Fr., 1893, p. cclii (published 30 December 1893).—1894. *Gryllodes macropterus*, Fuente, Actas Soc. Esp. Hist. Nat., XXII, p. 137 (published 31 January 1894).—1902. *Gryllodes finoti* Krauss, Verh. zool.-bot. Gesellsch. Wien, LII, p. 253 (**syn. nov.**).—1912. *Gryllodes macropterus?*, Uvarov, Horae Soc. Entom. Ross., XL, no. 3, p. 41.—1915. *Gryllodes dulcisonans*, Semenov-Tjan-Shansky, Rev. Russe Entom., XV, p. 454 (**syn. nov.**).—1927. *Gryllodes* (*Gryllodinus*) *kerkennensis*, I. Bolivar, Bol. Soc. Esp. Hist. Nat., XXVII, p. 102. Siwa, 9. viii, 1 ♂, 1 ♀; Siwa depression, 22. viii, 1 ♂.

Correct specific synonymy of this species has been established by I. Bolivar in 1927, but he has overlooked *G. finoti* and *G. dulcisonans*, which are also mere synonyms. As regards the generic name, I. Bolivar proposed a subgenus *Gryllodinus* based on *G. macropterus* ("el grupo o las especies del tipo del *G. macropterus* Fuente"). His paper, however, appeared in the part of the Bol. Soc. Esp. Hist. Nat. which has been published on 28 February 1927, and on the 1st February of the same year there was published a paper by Chopard (Ann. Mag. Nat. Hist., ser. 9, XIX, p. 255), where he proposed a new genus *Eugryllodes* for the same group of species, with *G. pipiens* Duf. as the type. Therefore, *Gryllodinus* I. Bolivar is a synonym of *Eugryllodes* Chopard (**syn. nov.**).

The known distribution records of *E. kerkennensis* cover the whole Eremian region, and the apparent discontinuity is probably due to the habits of this cricket, whose highly characteristic song (compared with that of a tiny electric bell made of silver) can be often heard while the insects themselves are practically impossible to discover. In northern Africa, *E. kerkennensis* is known from many points in the Sahara, and from the Kerkennah island off the Tunisian coast (typical locality); in Spain, apparently the only record is Ciudad Real (typical locality for *E. macropterus* Fuente). Our Siwa record is the first for the more eastern parts of Northern Africa, but the species is known to me also from several localities in Arabia (Hedjaz and Kuwait), as well as from Cyprus. Further east it is known from Iraq and Transcaspia (typical locality for *G. dulcisonans*), while it occurs also in the Caspian deserts of Transcaucasia and of Northern Caucasus.

TETTIGONIIDAE.

CONOCEPHALUS sp. Siwa, 11. vii, 1♀ larva.

GRYLLOTALPIDAE.

GRYLLOTALPA GRYLLOTALPA (Linnaeus, 1758). Siwa, 28. vii, 27. viii, larva; Khamissa, 22. vi.

A common pest in the Nile valley.

GRYLLOTALPA AFRICANA Palissot de Beauvois, 1805. Siwa, 18. iv; 8. ix, larva; 10. ix, larva.

ACRIDIDAE.

ACRIDELLA NASUTA (Linnaeus, 1758). Siwa, 20–22. iv, 29–30. vi, 9–31. vii, 3–16. viii, 10. ix; Siwa depression, 12. vii; Siwa, Tagzerti, 12. vii; Siwa, Zegawa, 22. vii; Jagub, 18. viii.

It does not seem possible to retain the old view that this species is extremely variable and to quote under its synonymy over a dozen names (cf. Kirby, Syn. Cat. Orth., III, p. 95). For example, probably most of the species described by Klug over a hundred years ago will have to be regarded as distinct species characterized not only by coloration but also by morphological characters (see my notes on two of them in Proc. Zool. Soc. Lond., 1933, p. 263).

On the other hand, the long series of specimens from Siwa suggests the probability of intraspecific variation affecting mostly the coloration of posterior wings in the female. The Siwa specimens do not show any

morphological characters that might be used for separating them from the Algerian, Moroccan and southern European specimens, and no difference even in the coloration of posterior wings can be seen between the Mediterranean and the Siwa males. However, females from the Mediterranean countries have the posterior wings strongly suffused with reddish pigment, which extends usually beyond the middle of the wing. This pigment appears to be spread mainly along the principal veins, but the wing membrane is also definitely pigmented. At the very base of the wing, on the metanotum and the first tergite, blue pigment is also present, but in the wings themselves this pigment appears to be completely suppressed by the red one. The Siwa females are, on the other hand, characterized by definite reduction in the intensity of the red pigment, so that in most cases the basal portion of the wing appears entirely blue: sometimes faint purplish shade is apparent, and in the extreme cases the wing may represent a bleached copy of the colours observed in Mediterranean females.

The blue-winged Siwa females are so strikingly different from the typical red-winged Mediterranean form that it would be permissible to regard the Siwa form as a subspecies. I refrain from doing so for two reasons. In the first instance, it is practically impossible to draw any line separating the two colour forms, since the Mediterranean type of wing coloration is obviously caused by the excessive development of the red pigment submerging the original blue which is present in both forms, and is the only one remaining in the typical Siwa females. My second reason is a possibility that the degree of development of the red pigment may even be a phenomenon connected with the seasonal development of an individual. In *Schistocerca gregaria* (Forskål), for example, red pigment of body and wings is present only in sexually immature adults, while on maturation it gives way to yellow. In *Nomadacris septemfasciata* (Serville), on the other hand, colourless wings become red on sexual maturation. It is not impossible that changes in the red pigmentation of wings in *Acridella nasuta* also depend on sexual maturation, but there is no evidence to show whether the red pigment in this case is a juvenile or an adult character, since the seasonal life cycle of this species remains unknown. Against this theory is the fact that the fairly long series of Mediterranean females studied by me is very uniform in the degree of development of the red pigment, although the specimens bear very different dates. Moreover, none of the authors writing on *Acridella nasuta* (except those who confused under this name various other species) mentioned that the wings may be blue: this suggests the geographical, rather than seasonal, character of type of coloration.

To summarize, the Siwa specimens should probably be regarded as a local colour form differing in a *tendency* amongst females to an underdevelopment of the red wing pigment, as compared with the typical Mediterranean females. This tendency may be due to the local climatic conditions (e.g. low humidity), but it is scarcely sufficient to characterize a distinct subspecies, particularly because the males are indistinguishable from the Mediterranean ones. I hope, nevertheless, that the above notes will stimulate other authors to more exact observations on the wing colour of females from different localities, and taken at different seasons.

The distribution of *Acridella nasuta* comprises North Africa, down to Saharan oases (e.g. Timimoun), and drier parts of south-western Asia, with more or less isolated occurrences in the extreme south of Europe. In North African deserts the species is definitely restricted to oases.

PLATYPTERNA GENICULATA I. Bolivar, 1913.—1913. *Platypterna geniculata*, I. Bolivar, Novit. Zool., XXX, p. 607.—1927. *Platypterna pruinosa agedabiae*, Salfi, Boll. Soc. Nat. Napoli, XXXIX, p. 244, fig. 7.—1931. *Platypterna geniculata*, Salfi, Eos, VII, p. 293, figs. 76–102. Siwa, 27–29. vi, 11–24. vii, 4. viii, 1 ♂; Siwa, Redunkalil Tutnatee, 26. vi; Gara, 4. vii; Khamissa, 29. vi, 1 ♀; Khamissa depression, 19. vii; Gagub, 17–19. viii.

In determining this species as *P. geniculata* I am following Salfi's monograph, although his re-description of the latter was not based on typical specimens, and co-types before me show some differences from the present series.

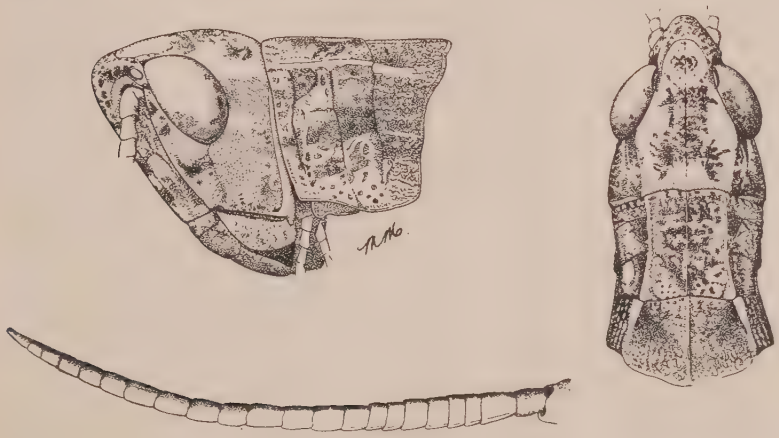


FIG. 2.—*Duroniella cooperi*, **sp. n.**, ♀

DURONIELLA COOPERI, **sp. nov.**

One of the larger known species, similar in general habitus to *D. gracilis* Uvarov and *D. laeviceps* Uvarov.

♂. Antennae longer than head and pronotum together, weakly compressed and expanded in the basal part; eighth joint a little longer than wide, the rest very strongly elongate.

Face strongly reclinate. Frontal ridge in profile very weakly convex; its surface with a deep sulcus, gradually widening downwards, scarcely expanded between antennae. Lateral facial carina, viewed laterally, weakly bow-shaped. Fastigium of vertex well prominent forward, distinctly longer than at the base, broad; apex parabolic: surface concave, with distinct bow-shaped sulcus; margins low, punctured: median carinula distinct, extending back beyond the middle of the occiput. Upper surface of head with subobsolete scattered punctures.

Pronotum relatively long. Disc with large but very shallow, partly almost obsolete, punctures. Lateral carinae practically parallel, somewhat excurved and divergent only near the posterior end of prozona, more divergent in metazona, almost reaching its posterior margin. Median carina well distinct throughout, slightly irregular. Typical sulcus distinctly behind the middle, the ratio of length of prozona : metazona being 4 : 3. Posterior margin broadly rounded. Lateral lobe of pronotum rugulose. Pleurae strongly rugulose and punctured. Sternum with distinct, widely scattered punctures.

Elytra extending a little beyond hind knees.

Cercus distinctly incurved. Subgenital plate with truncate apex.

General coloration light yellowish-brown, with indefinite chocolate-brown pattern. Hind femur with some brownish dots along the carinae. Wings hyaline. Hind tibia light greyish-brown, with brown dots.

♀. Considerably larger than the male. Antennae nearly as long as head and pronotum, distinctly expanded basally. Fastigium of vertex about as long as it is broad at the base; bow-shaped sulcus shallow but distinct; median carinula distinct. Disc of pronotum distinctly rugulose: lateral carinae weakly constricted in the middle of prozona.

General coloration light green, with the dorsum generally pale rusty brown; elytra with a series of brownish spots.

Length of body, ♂ 21, ♀ 31; pronotum, ♂ 3·6, ♀ 5; elytra, ♂ 17, ♀ 22; hind femur, ♂ 12, ♀ 16·5 mm.

Siwa, 4. vi, 3 ♂♂; 22. vi, 1 ♂; 28. vi, 1 ♂; 29. vi, 1 ♂; 30. vi, 1, ♂ 2 ♀♀; 10. vii, 1 ♂, 1♀; 11. vii, 4 ♀♀; 16. vii, 4 ♂♂, 2 ♀♀; 16–17. vii, 3 ♂♂; 17. vii, 4 ♂♂, 1 ♀; 18. vii, 3 ♂♂, 3 ♀♀; 24. vii, 1 ♂, 1♀; 5. viii, 2 ♂♂; 9. vii, 1 ♂; 2. ix, 1 ♂; Siwa, Zegawa, 22. vi, 2 ♂♂; Siwa, Redunkalil Tutnatee, 26. vi, 1 ♂, 2 ♀♀. Koreishid, 30. vi. 9 ♂♂ (including the *type*), 5 ♀♀; Maragi, 14. viii, 8 ♂♂, 1♀; Khamissa, 29. vi, 12 ♂♂. 7 ♀♀; Jagub, 17. viii, 2 ♂♂.

There is very little variation in size amongst the long series of specimens. As for the coloration, the pattern normal for the genus is sometimes more strongly pronounced, and the green form is relatively rare. A peculiar colour form, not known to me in other species of the genus, is that of dirty greyish-brown general colour, very irregularly mottled with darker spots and dots, which on the upper side of the hind femur form definite fasciae. These different colour varieties do not seem to have any correlation with locality or date and represent probably genetic variations, parallel to those observed in many genera of Acridinae (see Rubtzov, Bull. Entom. Res., xxvi, 1935, pp. 499–520): Clark, Ent. Mon. Mag., lxxix, 1943, p. 91.

The new species is remarkable for its relatively large size, being approached in this respect only by *D. gracilis* Uv., occurring in Central Asia. It differs from that species by longer fastigium of vertex, by a distinct median carinula on the head, by rugulose pronotum and pleurae, by more curved male cercus and by truncate male subgenital plate. This latter character exhibits, however, some individual variation, since in some males the plate is almost conical, while another extreme is reached when the plate is almost bituberculate.

D. cooperi is the third species of the genus known to occur in North

Africa, the other two being *D. lucasii* I. Bol. from Algeria and Egypt, recorded also from the Giarabub oasis, and *D. laurae* Borm. of Tunisia. Both these species, however, belong to another group, characterized by rather thick-set body and short antennae distinctly incrassate in the apical portion. The nearest relatives of *D. cooperi* are *D. gracilis* Uv. of Central Asia and *D. laeviceps* Uv. of SW. Iran. A discussion of the zoogeographical characters of *Duroniella* will be found in the general part of the present paper.

AIOLOPUS STREPENS (Latreille, 1804). Siwa, 22–29. vi, 7–18. vii, 9–21. viii; Siwa, Zegawa, 22. vi; Siwa, Redunkalil Tutnatee, 26. vi.

All the specimens are rather uniform in size and in the light buff-grey coloration, with strongly spotted elytra and brightly coloured hind legs. Both in the coloration and in the structure of pronotum they cannot be classified as *A. savignyi* Kr., prevalent in Egypt (see Uvarov, Bull. Ministry Agr. Egypt, no. 41, 1924, p. 21, as *A. strepens affinis* I. Bol.: also Trans. Amer. Entom. Soc., LXVII, 1942, p. 337).

SPHINGONOTUS RUBESCENS (Walker, 1870). Siwa, 23. vii, 1 ♂: Siwa depression, Zeitoun, 29. viii, 1 ♂.

This is the commonest and most widely spread species of a typical Eremian genus.

ACROTYLUS INSUBRICUS INFICITUS (Walker, 1870).—1870. *Oedipoda inficita*, Walker, Cat. Derm. Salt. Brit. Mus., IV, p. 742.—1925. *Acrotylus insubricus*, Uvarov, Trans. Entom. Soc. Lond. 1925, p. 279.—1933. *Acrotylus insubricus inficitus*, Uvarov, Proc. Zool. Soc. Lond., 1933, p. 267. Siwa, 4–30. vi, 4–30. vii, 9–12. viii; Siwa depression, Zegawa, 22. vi; Siwa, Redunkalil Tutnatee, 26. vii: Siwa depression, Zeitoun, 29. viii: Gara, 4. vii; Maragi, 14. viii; Khamissa, 29. vi.

This is the subspecies common in desert oases of North Africa and Arabia, which is replaced in the Mediterranean countries by *A. insubricus insubricus* (Scopoli), and in Somaliland, Iran and Central Asia by *A. i. innotatus* Uvarov (Proc. Zool. Soc. Lond., 1933, p. 267). It has been repeatedly recorded from oases of Italian Libya under the incorrect name *A. patruelis* H. S. and as *A. insubricus* var., or merely as *A. insubricus*.

PYRGOMORPHA COGNATA Krauss, 1877 (figs. 3, A; 4, C–I; 5, E).—1877. *Pyrgomorpha cognata*, Krauss, Sitzber. Akad. Wiss. Wien, LXXVI, p. 58. Siwa, 22–30, vi, 7–31. vii, 6–13. viii, 1 ♂, 2–6. ix: Siwa, Zegawa, 22. vi; Siwa, Khamissa, 29. vi: Siwa, Tagzerti, 13. vii: Siwa depression, Zeitoun, 29. viii.

The determination of this species proved to be an extremely long task, since its differences from the Mediterranean *P. conica* have never been properly established, and both species proved to be subject to considerable variation, both individual and geographical. Since the type of *P. conica* Oliv. is non-existent, I have based my conception of this species on specimens from Marseilles, the original description having been based on material from 'provinces meridionales de la France'. The figures (3_B, 4_A, 4_B) show that *P. conica* is characterized by antennae very short and strongly expanded at the base: by the lower margin of pronotal lobes weakly sinuate and obtusely angulate behind; as well as by the fastigium of vertex constricted near the base. *P. cognata*, on the other hand (figs. 3_A, 4_C), has the antennae relatively slender, scarcely expanded

basally ; lower margin of pronotal lobes strongly sinuate, with the hind angle acute and attenuate, and the fastigium not constricted near the base (the figures are based on the male type from Senegal, kindly communicated by Dr. M. Beier from the Vienna Museum).

The long series of specimens from the Siwa oases proved to present considerable variation in regard to the size and coloration, there being no

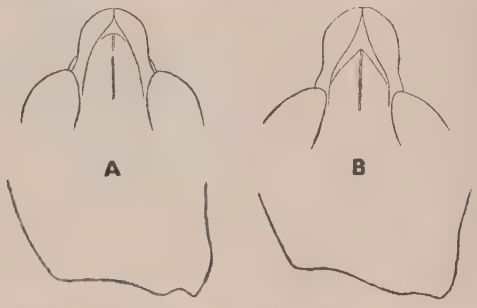


Fig. 3.—A, *Pyrgomorpha cognata* Krauss, ♂, type, head and lateral pronotal lobe ; B, *Pyrgomorpha conica* (Oliv.), ♂, Marseilles, same parts.

Fig. 4.—Antennae in : A, *Pyrgomorpha conica* (Oliv.), ♀, topotype, Marseilles ; B, ditto, ♂, Marseilles ; C, *P. cognata* Krauss, ♂, type, Senegal ; D, ditto, ♂, Siwa, 9. viii ; E, F, ditto, ♂, Zegawa, ♂, 22. vi ; G, ditto, ♂, Siwa, 22. vi ; H, ditto, ♂, Zegawa, 22. vi ; I, ditto, ♂, Tazzertie, 13. viii.

apparent correlation of this variation with season or locality. Very perplexing proved to be the variation observed in the absolute and relative length of antennae. The extent of that variation can be seen from the

series of figures of male antennae (fig. 4, C–D). While some specimens agree exactly in the structure of the antenna (as well as in other respects) with the type of *P. cognata* (e.g. fig. 4, E), others have the antenna shorter and somewhat expanded basally (e.g. fig. 4, D), without, however, reaching the condition typical for *P. conica*. The majority of specimens have antennae definitely longer and more slender than in *P. cognata* (e.g. fig. 4, F–I), but the whole series, from the longest to the shortest antennae, is quite continuous. Moreover, all types of antenna occur in a long series of specimens taken at Zegawa on 22. vi, and probably belonging to the same population. I think, therefore, that this variation in antennae should be regarded as individual and has no taxonomic significance.

It should be noted, however, that even the shortest antenna in the Siwa specimens (fig. 4, D) differs clearly from that in *P. conica* by the greater number of segments, there being 13 visible segments, disregarding the incomplete division of the proximal segment, which is actually the third from the base, two basal ones being left out from the figures. In *P. conica* the number of segments is only 11, and the segments near the base are strongly transverse (fig. 4, A, B).

It is impossible to discuss the distribution of *P. cognata*, as this would require a laborious critical study of all available material, the old records being unreliable. The species was originally described from Senegal, and appears to extend almost to Mediterranean coasts, where it overlaps the area of *P. conica*. In any case, it represents in desert oases a clear case of a tropical element.

Pyrgomorpha minima, **sp. n.** (fig. 5, A, B, C).

A very small species characterized by short and stout antennae, very short fastigium of vertex, and short, not curved, male cerci.

♂. Antennae shorter than head and pronotum together, very slightly flattened and expanded at the base, the rest composed of short, rounded joints with very indistinct puncturation (shape and proportions of joints shown in fig. 5, C).

Head distinctly ascendant above pronotum. Face strongly oblique; frontal ridge sulcate almost down to the clypeal suture, raised and compressed between antennal bases. Fastigium of vertex a little longer than broad, widely rounded in front. Vertex between eyes with a strong median carina and well developed lateral carinae which are straight and parallel to the median. Eyes very strongly prominent sideways; viewed in profile they are little longer than high.

Pronotum short, very weakly saddle-shaped, its surface with shallow punctures and callous rugosities. Median carina low and obtuse, almost obsolete between the second and third sulcus, which are the only ones developed. Metazona equal in length to three-eighths of the whole pronotum, rounded behind. Lateral carinae in front of the second sulcus low but quite distinct, strongly bisinuate: between the sulci they are straight but less distinct, and disappear in metazona. Lateral lobe relatively short; the lower margin weakly sinuate, with the posterior lower angle scarcely attenuate, obtuse.

Prosternum with a very small, obtusely conical tubercle. Mesosternal interspace as broad in front as it is long, moderately narrowed posteriorly; mesosternal lobe with the inner and posterior margin equal in length.

Cercus very short, stout, not decurved as in *P. cognata* Kr. (cf. fig. 5 D and E).

Posterior femur relatively short and thick; external genicular lobe with short blunt apex.

General coloration whitish-sandy, with the callosities mainly white. Lateral pronotal lobes brown in the upper half, white in the lower. Elytra and legs with a few grey streaks. Wings hyaline.

♀. Antennae much shorter than head and pronotum, distinctly compressed basally.

Length of body, ♂ 12, ♀ 16: pronotum, ♂ 2·5, ♀ 3; elytra, ♂ 11, ♀ 15; hind femur, ♂ 5·5, ♀ 7 mm.

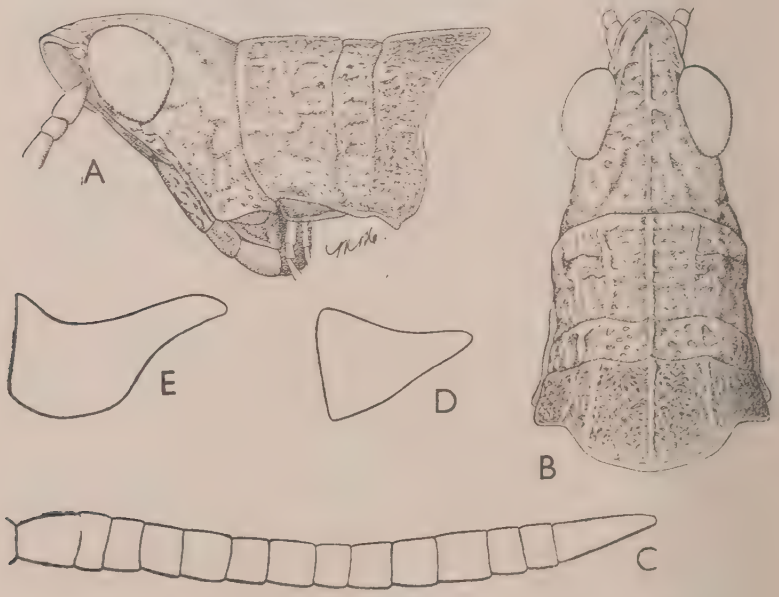
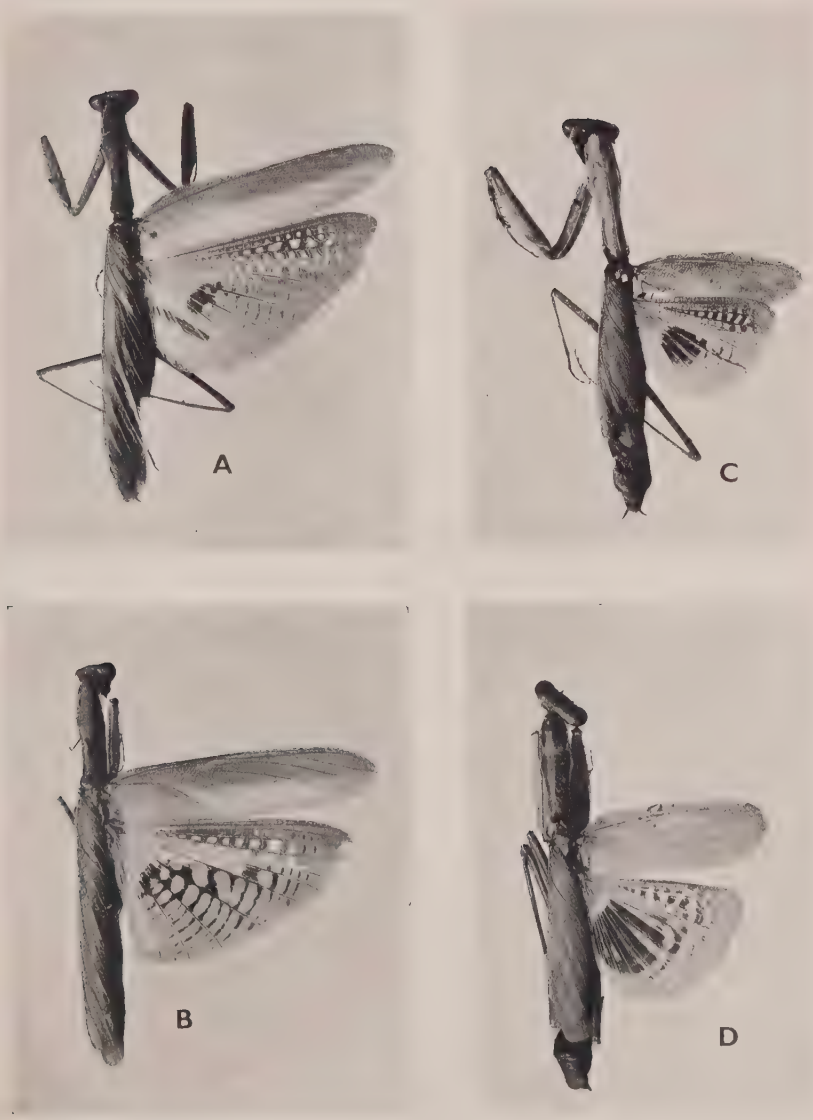


FIG. 5.—A–C, *Pyrgomorpha minima*, sp. n., ♀; D, ditto, male cercus; E, *Pyrgomorpha cognata* Krauss, male cercus.

Described from 1 ♂ (*type*) and 2 ♀♀ labelled Jagub (correctly Gagub), 17–19. viii, 1935: 1 ♂ from wadi Rachid, Egypt, 4. iv. 1917 (British Museum collection).

The characters indicated at the head of the description are so definite that I have no doubt of their specific validity. The wadi Rachid male is slightly larger than those from the Jagub oasis, but otherwise agrees with the types in all characters.

The oasis of Jagub (also Gagub, or Qeiqub) is described by Dr. Omer-Cooper as 'a miserable oasis. There is no drinking water, and the small marsh is very saline. Collecting was poor, and I spent little time there'.



IRIS ORATORIA
Subspecies *coeca* (A, B and C) and *oratoria* (D).

It would appear from this description that *P. minima* may be a strictly localized species, perhaps connected with halophilous vegetation.

The wadi Rashid, or Risheid (also called Gibba), in Egypt, is the end of wadi Garawi and lies four kilometres south of Helouan (lat. 31° 15′; long. 29° 50′).

Tropidopola longicornis longicornis (Fieber, 1853).—1853. *Opsomala longicornis*, Fieber, Lotos, III, p. 98 (*partim*!).—1926. *Tropidopola longicornis longicornis*, Uvarov, Eos, II, p. 171, figs. 9, 10. Khamissa, 29. vi, 2♂♂, 1♀ larva; Koreishid, 30. vi, 3♂♂, 1♀.

This subspecies is known from Egypt, Palestine and Syria, and has been recorded from Giarabub. In the coastal zone of Italian Libya and in Algeria it is replaced by *T. cylindrica cylindrica*.

Eyprepocnemis sp. Siwa depression, Zeitoun, 1♂.

I hesitate to identify this single male with the common Mediterranean *E. plorans* (Charp.), as it lacks the characteristic sulphurous stripe in the axillary area, which is loosely reticulated. In this respect the Zeitoun male closely resembles the tropical African *E. ibandana* G.-Tos, but in its habitus it is more like *E. plorans*.

It is unfortunate that this very interesting insect is represented by a unique specimen, which makes it impossible to reach a decision as to its affinities.

The name of the genus has been originally spelt by Fieber as *Eyprepocnemis*, but later amended by Stål to *Euprepocnemis*. This is a more correct transliteration from the Greek, and the name has been used in this form ever since, but the rules of nomenclature do not allow such amendments, and the original form, *Eyprepocnemis*, must be used.

Thisoicetrus annulosus annulosus (Walker, 1870). Siwa, 18. iv, 29. vi, 7–18. vii, 1–12. viii; Khamissa, 22–29. vi; Zegawa, 22. vi; Redunkalil Tutnatee, 26. vi; Maraga, 14. viii.

Full synonymy of this subspecies (better known under the name *charpentieri* St.) is given in a revision of the Palaearctic species and subspecies of *Thisoicetrus* which had to be undertaken as it was impossible to arrive at its determination otherwise (see Uvarov, Novit. Zoolog., XLI, 1939, p. 377).

Thisoicetrus littoralis similis (Brunner, 1861). Siwa, 31. vi, 1♂.

In this case also only a revision of the whole genus (loc. cit.) enabled me to arrive at the determination, which I believe to be correct.

Anacridium aegyptium (Linnaeus, 1764). Siwa, 18. iv, 10–31. vii, 1. viii; Khamissa, 22. vi, 1 nymph, 5. viii; Gara, 4. vii.

The hibernated females collected in April are of darker general colour than those of the new generation taken in the later months.

Schistocerca gregaria (Forskål, 1775). Siwa, 1. v, 1♀; 22. vi, 1♀. Both females are typical of the phase *solitaria*.

TETRIGIDAE.

Paratettix meridionalis (Rambur, 1839). Siwa, 1. ix, 1♀.

EXPLANATION OF THE PLATE.

A. *Iris oratoria coeca* Uv., atypical male from Siwa.
B. „ „ „ „ typical male from Taif, Arabia.
C. „ „ „ „ atypical female from Siwa.
D. „ „ *oratoria* L., typical female from Algeria.

Discussion.—

Dr. Malcolm A. Smith commented on Dr. Uvarov's suggestion that his insects are relics of a pre-Pleistocene fauna developed under a more tropical climate, saying that even 2000 years ago much of the Sahara was less dry than now.

Mr. I. H. Burkill suggested that this could be realized from what we know of life in Carthage.

Mr. K. N. Kaul said that further back in the Tertiary palms were common, as their fossil remains indicate.

PROCEEDINGS OF THE GENERAL MEETING.
26 November, 1942.

[A Meeting held conjointly with the Zoological Society of London.]

Dr. B. Barnes, Vice-President,
in the Chair

The Proceedings of the General Meeting held on Thursday, 12 November 1942, having been circulated, were taken as read and confirmed.

The following were thanked for gifts made to the Library since the last meeting :—Dr. W. E. Collinge, Mr. A. Steven Corbet, Dr. David Hooper, Mr. W. S. Lacey and The National Museum of Wales.

Attention was called to the donation from Dr. D. Hooper, consisting of some of the correspondence of Henry Prestoe (1842–1923), a Kew gardener who was Superintendent and Government Botanist at the Botanic Gardens, Trinidad, from 1864–1886.

The Vice-President in the Chair reported the deaths of Dr. E. E. Galpin and Dr. R. S. Rogers, Fellows of the Society.

The following candidates were balloted for and elected Fellows : — Charles Aubrey Hamilton Franklyn, M.D., M.B., B.Sc., M.R.C.S., L.R.C.P., James Maxwell McConnell Fisher, M.A., Alexander James Edward Cave, M.D., George Woodrouffe Harris, B.A., James Desmond Smyth, B.A., B.Sc., Ph.D., Edgar Pickard, Frank David Armitage and Alfred Deans Peggs, B.Sc., M.Sc.

Dr. Malcolm A. Smith exhibited a living specimen of the freshwater tortoise *Platysternum megacephalum*, a native of Indo-China, and recently acquired for the Gardens of the Zoological Society of London. He pointed out its many primitive characters and suggested that it was probably the most primitive chelonian now living.

Mr. I. H. Burkill exhibited and discussed the morphology of a leaf of *Tamus communis* Linn., with two petioles as a result of an early injury. (Discussed by Dr. T. A. Sprague and Miss R. F. Shove : Mr. Burkill replied.) [Account printed in full below.]

Mr. J. S. Perry read a paper entitled 'Reproduction in the Water Vole'. (Discussed by Dr. Malcolm Smith; Mr. Perry replied.)

Abstract (the full paper will be published by the Zoological Society).—The water-vole, which is diurnal in habit, lives in burrows in river and canal banks. It is of economic importance in Russia, where it is trapped for its pelt and where it carries the disease Tularemia. Its reproductive cycle is very like that of the field-vole and bank-vole. The breeding season extends from late March to the end of September. In winter the males are non-fecund and the females anoestrous. There is a typical rodent poly-oestrous cycle, with a post-partum oestrus and a lactation anoestrus. Pregnancy may accompany lactation, especially in spring. Animals may breed in the year of their birth, and unmated cycles may or may not precede copulation.

In the absence of the author, Mr. E. W. Mason gave an account of the following paper:—

Mr. C. G. Hansford. Contributions towards the Fungus flora of Uganda.—V. Fungi imperfecti. (Discussed by the Vice-President in the Chair and Mr. F. C. Deighton; Mr. Mason replied.) [Printed in full below, p. 34.]

A LEAF OF TAMUS COMMUNIS LINN. WITH TWO PETIOLES AS A RESULT OF AN EARLY INJURY.

By I. H. Burkill.

During an examination into the variability of the leaf of *Tamus communis*, the Black Bryony, three leaves were found with the apex doubled (fig. 6) and one with the petiole doubled (fig. 1). The latter exceedingly curious abnormality was drawn, the lamina pressed and the lower parts

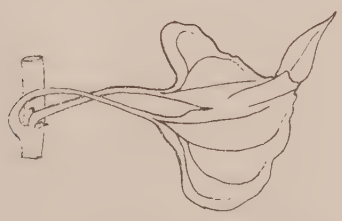


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Fig. 1.—The abnormal leaf with its two petioles. × ½. Fig. 2.—The parent stem in section just above the insertion of the leaf, the pediment of the leaf with a single axillary bud, and its two stipule-like organs, and the two petioles in section through their lower pulvini. × 5. The common and cauline bundles, which are of different sizes, were distributed in the stem just above the injured leaf as indicated.

of the petioles with the parent stem preserved in alcohol for examination. The ultimate findings were that the leaf, when rudimentary, had received an injury near the base which had split the tissues dorso-ventrally, and that the halves had proceeded to make good.

The cause of the injury is not ascertainable. The leaf itself and two leaves immediately following it showed such distortions as arise from the feeding of the Hemipteron, *Philaenus leucophthalmus* Linn.; but it is difficult to understand how punctures of this insect could cause a neat splitting. The location of the injury was above the pediment, as fig. 2 shows, and involved more than that part of the rudiment destined to be petiole: it cut into the lower end of the part destined to be lamina. The nature of the injury was such that the severed parts did not reunite. The sequel to failure to reunite was conversion of the halves into subnormal petioles, each with its own lower pulvinus. The degree of subnormality is illustrated by figs. 4 and 5. Fig. 3 is the shaft of a normal petiole in section, showing the outline and the positions of the vascular bundles. Figs. 4 and 5 are sections of the shafts of the two subnormal petioles. The ridges *a* and *a'* are the margins of the groove characteristic of the upper side of the petiole of *Tamus*: their origin is extremely early in the

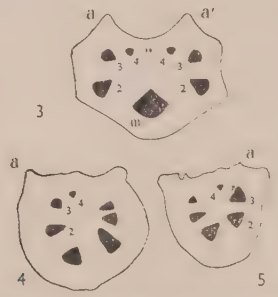

FIG. 3.—A normal petiole in section with nine bundles (the number is often raised, even to 15, by intercalation). FIGS. 4 and 5.—Sections through the abnormal petioles, the bundles numbered as in fig. 3. *a* and *a'*, the ridges marging the groove on the face of the petiole: *m*, the median bundle seen in fig. 3, but replaced by 4 and 3 bundles in figs. 4 and 5. In the lower pulvini (*cf.* fig. 2) the positions and sizes of these bundles were slightly altered by anastomosing.

growth of the leaf-rudiment, which at the length of 1 mm. is already triangular in section; and its lateral angles become these ridges and are thrust forward by the building up of the greater part of the petiole behind them. The vascular bundles in fig. 3 are: *m*, the median; *2*, *3* and *4* those which in decreasing size flank it. Petioles larger than this one have small intercalated bundles variously connected at base and apex with the larger bundles, as Bucherer has noted (Biblioth. bot. no. 16, p. 26; 1889), an observation of some importance, as showing that to create new bundles is easy. But it is to be noted that the margin of the leaf is scalloped where the lateral nerves end, which suggests some interference. The flanking bundles in the subnormal petioles are recognizable, and in figs. 4 and 5 are identified by the numbers used in fig. 3. The rest of the bundles, four in one petiole and three in the other, may be regarded as replacing the median bundle. The injury manifestly was itself almost median, so that the tissue was split where the bundle *m* would have appeared in due time.

It is well known that very young stems and very young roots medially split can regenerate in such a way that the halves become each a normal or subnormal stem or root. Dr. R. Snow has recently added to our knowledge of this phenomenon by describing experiments made on seedlings of *Helianthus annuus* and *Phaseolus multiflorus* ('New Phytologist', XLI, p. 101; 1942), wherein the halves proceeded far towards rounding themselves and acquired cambium at the appropriate depth below the surface. My abnormal half-petioles of *Tamus* had taken the same course towards becoming each a complete petiole as his halved axes had towards becoming complete axes. In such repair work the surface plays a leading part, being the limit of a morphogenetic field—the limit of the organism itself. The bundles called out in the halved petioles were produced at a normal depth below the epidermis, just in the manner of the cambium in Dr. Snow's halved stems and roots. It would scarcely be right to call the four unlettered bundles in fig. 4 and the three in fig. 5 fragments of the median; they are replacements with their origin, not in cells pre-

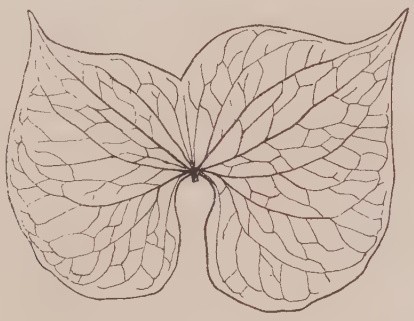

FIG. 6.—A bifid leaf, $\times \frac{1}{2}$.

destined to become the median vascular strand, but at a position determined by the area of the morphogenetic field. Sooner or later cells become predestined, wherewith the morphogenetic field begins to pass away.

From figs. 4 and 5 it is seen that the vascular bundles on the inner sides of the two halves were larger than those of the outer, i.e., that the shaping of the halves to the semblance of one complete whole was imperfect in this. For a reason it is only necessary to recall that the lamina was not split, and its central area must have had a call on greater vascular supply that its lateral areas. So the vascular ring, having been completed, grew in its different parts in proportion to the demand on them. The completion of the ring preceded the call on its parts.

The three leaves mentioned at the outset as bifid are not without interest. One is figured as fig. 6. The rather slender median nerve should be noted, as its presence indicates fission at the apex of the leaf-rudiment. The cause of the fission cannot be stated any more than the cause of the split of the petiole; but when the fission was established, the imperfectly

divided halves did their best to perfect themselves. New midribs were established, and lateral primary nerves constructed about them. I would call attention to two characters shown in the figure : (i) the apices are curved inwards, and (ii) the auricles are large. The curving of the apex is in agreement with the curving which follows an injury to the margin below the apex, and is attributable to the push of the better developed side of the lamina. The increase of size in the auricles is what follows an injury to the apex of the lamina ; it follows, also, the removal of the stem above a leaf in mid-growth and results from increased nutriment being made available, the auricles being the last produced parts of the lamina.

CONTRIBUTIONS TOWARDS THE FUNGUS FLORA OF UGANDA.—V. FUNGI IMPERFECTI.

By C. G. Hansford, M.A., F.L.S.,

Senior Plant Pathologist, Uganda Department of Agriculture.

Parts I and II appeared in the Journal, *Botany*, li, pp. 256–84 and 537–45 ; parts III and IV in the Proceedings, session 1940 1, pp. 4–52 and 92–7.

SPHAERIOIDACEAE.

1. Cicinnobolus Cesatii De Bary in De Bary & Woronin, Morph. u. Phys. d. Pilze, iii, p. 71 (1870). On *Oidium Heveae* on *Hevea brasiliensis*, Kampala, *Snowden 708* ; on *Oidium* sp. on *Euphorbia*, Kampala, *Hansford 1294*.

2. **Phyllosticta entebbeensis** Hansford, sp. n. *Maculae* albidae, margine brunneo-cinctae, haud zonatae. *Pycnidia* epiphylla, atra, globosa, immersa, ostiolis erumpentibus pallidioribus praedita, 160–200 μ diam. *Conidia* singula, terminalia, ovata, hyalina, continua, 9–11 × 6–7 μ ; conidiophora brevia, erecta, simplicia.

Hab. in foliis *Aloes* spec., Entebbe Botanic Gardens, *Hansford 1885*.

It differs from *P. Aloes* Kalchbr., *Phoma Debauxiana* Sacc. and *P. aloicola* Trinch. in size and shape of conidia.

3. Phyllosticta divergens Sacc. in Malpighia, v, p. 281 (1891). On *Albizzia zygia*, Namanyonyi, *Dummer 2902* (det. Kew).

4. Phyllosticta gossypina Ell. & Mart. in Journ. Mycol., ii, p. 129 (1886). On cultivated cotton, *Small* !

5. Phyllosticta Heveae Zimm. in Bull. Inst. Bot. Buitenzorg, x, p. 21 (1901). On leaves of *Hevea brasiliensis*, Kampala, *Small 576*, *559* ; *Snowden 690*.

6. Phyllosticta ramicola Petch in Ann. Roy. Bot. Gard. Perad., iii, p. 5 (1906). On dead stem and branches of *Albizzia moluccana*, Kampala, *Small 365*.

7. Phoma aloicola Trinch. in Rend. Accad. Sci. Napoli, fasc. 3–4, p. 90 (1909). On *Aloe*, *Dummer 2312*.

8. Phoma glumarum Ell. & Tracy in Journ. Mycol., iv, p. 123 (1888). On rice, Kampala, *Small* !

9. Phoma Heveae Petch in Ann. Roy. Bot. Gard. Perad., iii, p. 5 (1906). On dead twigs of *Hevea brasiliensis*, Kampala, *Small 3*.

10. Phoma insidiosa Tassi in Bull. Lab. Ort. Bot. Siena, 1898, p. 8. On seed-heads of *Sorghum*, *Snowden 724, 725* (det. Imp. Mycol. Inst.).

11. Macrophomina Phaseoli (Maubl.) Ashby in Trans. Brit. Mycol. Soc., xii, p. 141 (1927). On roots of the following plants, mostly in the sterile stage (*Rhizoctonia bataticola*) :

Arachis hypogaea, Buddleia, Cajanus indicus, Capsicum annuum, Cassia spp., *Citrus* spp., *Codiaeum, Coffea* spp., *Crotalaria juncea, C. agatiflora, C. intermedia, C. lancifolia, Cucumis, Dahlia, Dianthus caryophyllinus, Glycine sojense, Gossypium hirsutum, Guizotia abyssinica, Helianthus annuus, Hibiscus esculentus, Ipomoea Batatas, Lupinus, Medicago sativa, Nicotiana Tabacum, N. rustica, Phaseolus lunatus, P. Mungo, P. radiatus, P. vulgaris, Pisum, Rosa, Sesamum indicum, Sesbania aegyptiaca, Solanum Lycopersicum, S. tuberosum, Tephrosia candida, T. Vogelii, Vigna sinensis, Zea mays.*

This fungus appears to be common in Uganda soils in most parts of the country and is able to invade the roots of many plants when their vitality is reduced. It is not considered to be an important parasite, and inoculations on *Sesamum*, *Gossypium*, *Crotalaria* and *Phaseolus* have given consistently negative results in the laboratory. On cotton the fungus is particularly associated with patches of soil liable to water-logging. It causes a common rot of the tubers of sweet potato, but under local conditions this disease rarely becomes of great importance.

12. Phomopsis vexans (Sacc. & Syd.) Harter in Journ. Agric. Res., ii, p. 338 (1914). A culture corresponding very closely to this was isolated by the writer from damaged seed inside rotting pods of *Capsicum frutescens*, Kampala, March 1938 : inoculations on young pods caused a rotting of pods and seed.

13. Placophomopsis Heveae Grove in Journ. Bot., lix, p. 315 (1921). On dying branches of *Hevea brasiliensis*, Kampala, *Snowden 672, Small 541.*

14. Leptodothiorella advena Syd. in Ann. Mycol., xxxvii, p. 238 (1939). On *Justicia laxa*, Masaka Road, *Hansford 2084.*

15. Hypocline Penniseti Syd. in Ann. Mycol., xxxvii, p. 246 (1939). On *Pennisetum ? trachyphyllum*, Kabale, *Hansford 947.*

16. Naemosphaera spp. Common parasites of *Meliola* spp. in Uganda, *Hansford 804, 1331, 1356, 1357*, etc.

No attempt has been made to distinguish between the collections made in Uganda hitherto, so that it is not known whether more than one species occurs here. The nomenclature of this genus is at present very confused, and it may prove necessary to erect a new genus for the *Meliola* hyperparasites.

17. Coniothyrium Fuckelii Sacc. in Nuovo Giorn. Bot. Ital., viii, p. 200 (1876). On roses, causing canker, Kivuvu, *Small* !

18. Cladochaete setosa (Wint.) Sacc., Sylloge, xxii, p. 986 (1913). *Chaetomella Cavallii* Matt. in Ann. di Bot., vii, p. 144 (1908) and in Il Ruwenzori, p. 583 (1907). On paper-wrapping specimens, in forest, Ruwenzori, *Abruzzi Expedition.*

19. Capnodiastrum sp. On *Olea chrysophylla*, Ankole, *Hansford 2081* (*leg. J. T. Kennedy*).

20. Cicinnobella spp. Species of this genus are fairly common as hyperparasites on *Meliola* and similar fungi ; their classification and relation to their perfect stages is reserved for further investigation.

21. Ascochyta Boehmeriae Woronichin in Not. Syst. Inst. Crypt. Hort. Bot. Reip. Ross., III, p. 31 (1934). On *Boehmeria nivea*, Kampala, 1936, *Hansford* !

22. Ascochyta Eriobotryae Vogl. in Ann. R. Acc. Agr. Torino, LI, p. 22 (1908). On *Eriobotrya japonica*, *Snowden 1922* ; this material differs from the description of *A. Eriobotryae* in that most of the conidia are $4\times2\,\mu$ to $8\times2{\cdot}5\,\mu$, very few reaching $11\times3\,\mu$; all are apparently 0–septate.

23. Ascochyta Gossypii Syd. in Ann. Mycol., XIV, p. 194 (1916). On *Hibiscus* sp., Kampala, *Hansford 1292*.

24. Ascochyta Phaseolorum Sacc. in Michelia, I, p. 164 (1878). On *Vigna sinensis*, Kampala, *Small 171*, *250*, *Snowden 976*, *Hansford 1298*, common ; on *Phaseolus radiatus*, Kampala, *Snowden 696*.

25. Darluca filum (Biv.-Bern. ex Fr.) Cast. in Cat. Pl. Marseill., Suppl., p. 53 (1851). On various Uredineae, *Small 580*, *Snowden 530*, *995*, *1002*, *Hansford 753*, etc. ; very common.

26. Diplodia natalensis Evans in Transvaal Dep. Agr. Sci. Bull., IV, p. 15 (1910). On orange-twigs, Kampala, *Hansford 2040*. This is usually considered a synonym of the next species.

27. Botryodiplodia Theobromae Pat. in Bull. Soc. Mycol. France, VIII, p. 136 (1892). A very common saprophyte on almost all woody plants and on dead wood ; *Snowden 478*, *482*, *Maitland* 392, *Small* !, *Hansford* !

28. Stagonospora Rosae Brun. in Act. Soc. Linn. Bord., extr. p. 17 (1898). On roses, Kampala, *Hansford 1900*.

29. Stagonospora Typhae Hoehnel in Sitzber. k. Akad. Wiss. Wien, CXVIII, p. 404 (1909). On Juncaceae indet., Entebbe Botanic Gardens, *Hansford 1879*.

30. **Hendersonia Setariae** Hansford, sp. n. *Pycnidia* atra, in foliis a *Helminthosporio* infactis immersa, globosa 100–220 μ diam. ; ostiolum glabrum, conicum, atrum, erumpens. *Conidia* atrobrunnea, fusoidea, utrinque rotundata, 10—18-septata, haud constricta $60—100\times5{\cdot}5—6{\cdot}5\,\mu$, recta vel leniter curvata.

Hab. in foliis *Setariae*, Nyakafumu, *Hansford 1200*.

The fungus occurs on leaf-spots caused by *Helminthosporium*, the pycnidia being scattered over the dead areas of the leaf. The conidia are widest about one-third of the distance from the base, and the apex is usually narrower than the base.

31. Hendersonia crastophila Sacc. in Michelia, I, p. 211 (1879). On *Exotheca abyssinica*, Bufundi, Kigezi, *Hansford 938*.

32. Hendersonia Protearum Wakef. in Kew Bull., 1918, p. 210. On *Protea madiensis*, Lumbwa, Kiagwe, *Dummer 2866*.

33. Hendersonia Sacchari Speg. in Rev. Fac. Agron. y Vet., II, p. 241 (1896). On dead culm of *Hyparrhenia*, Kampala, *Hansford*, *s.n.*

34. Camarosporium sp. On leaves of *Encephalartos*, Entebbe Botanic Gardens, *Hansford 2462*.

Pycnidia sunken, globose, black, scattered, 200–300 μ diam., with smooth erumpent ostioles ; wall of several layers of parenchyma but not carbonaceous or stromatic, inner layer hyaline to subhyaline. Conidiophores lining the wall of the pycnidium, short simple 0-septate, up to 20 μ long

by 5μ wide. Conidia single, acrogenous, dark olivaceous, citriform to elliptic, obtuse at ends, smooth, 17×9μ, at first 0-septate, when mature with 3–4 cross-septa and others longitudinal.

No species of this genus is recorded in the Sylloge as on Cycadaceae, but the above description applies to many known species of *Camarosporium*.

35. Septoria sp., cf. Carricerae Fairm. in Mycologia, v, p. 246 (1913). On *Enteropogon macrostachyum*, Karamoja, *Hansford 1468* (*leg. L. Lieberberg*).

36. Septoria Chenopodii West. in Bull. Acad. Sci. Brux., xviii, p. 396 (1851). On *Chenopodium album*, Mulange, *Dummer 3943*.

37. Septoria Coffeae Wakef. in Kew Bull., 1918, p. 210. On coffee leaves injured by hail, Kampala, *Small 480*.

38. Septoria Cucurbitacearum Sacc. in Nuovo bot. Giorn. ital., viii, p. 205 (1876). Conidia 80—90 × 3—4μ. On *Momordica*, Namanyonyi, *Dummer 3002* ; on *Melothria*, Kiwala, *Dummer 3060*.

39. Septoria Dianthi Desm. in Ann. Sci. Nat., ser. 3, xi, p. 346 (1849). On *Dianthus caryophyllinus*, Kampala, Kabale, Fort Portal, *Hansford* ! ; common in Uganda wherever this plant is cultivated.

40. Septoria Lactucae Pass. in Atti Soc. Critt. Ital., ii, p. 35 (1879). On *Lactuca*, Kipayo, *Dummer 2341*.

41. Septoria Lycopersici Speg., Fung. Argent., iv, no. 289 (1882). On *Solanum Lycopersicum*, Kampala, *Hansford*, common.

The Uganda form is hardly as destructive to the varieties of tomato grown here as that occurring in the U.S.A.

42. Septoria nesodes Kalchbr. in Grevillea, ix, p. 20 (1880). On *Hydrocotyle asiastica*, Kipayo, *Dummer 1338*, *1478*.

[Sphaeronema fimbriatum (Ell. & Halst.) Sacc., Sylloge, x, p. 215 (1892). On the tapped surface of *Hevea brasiliensis*, Kampala, *Snowden 720*, *722*, causing ' Mouldy Rot '. On *Caryota urens*, Kampala, *Snowden 723*. This species is now better known as *Ceratostomella fimbriata*. Its supposed ' pycnidia ' finally proved to be perithecia with extremely diffluent asci.]

NECTRIOIDACEAE.

1. Zythia nectriola Speg., Fung. Guar., i, p. 151 (1884). On *Commelina* sp., Kampala, *Hansford 786*.

2. Aschersonia crenulata Pat. & Har. in Journ. de Bot., xiv, p. 244 (1900). On insects on *Fluggea microcarpa*, Nagoge, *Dummer 3061 p.p.*

3. Aschersonia Zenkeri P. Henn. in Engl. Bot. Jahrb., xxiii, p. 541 (1897). On insects on *Fluggea microcarpa*, Nagoge, *Dummer 3061 p.p.*

DISCELLACEAE.

1. Phlyctaena anomala Petch in Ann. Roy. Bot. Gard. Perad., vi, p. 237 (1917). On *Theobroma Cacao*, Kampala, *Small 334*.

MELANCONIACEAE.

1. Colletotrichum atramentarium (Berk. & Br.) Taub. in Mem. New York Bot. Gard., vi, p. 554 (1916). *C. tabificum* Pethybr. in Trans. Brit. Mycol. Soc., vi, p. 109 (1919). Isolated in culture from tubers of *Solanum tuberosum*, Kampala, *Small*.

2. Colletotrichum coffeanum (Del.) Noack in Zeitschr. f. Pflanzenkr., II, p. 196 (1901). On coffee, *Small 116, 532, 639, 640.*

3. Colletotrichum Camelliae Mass. in Kew Bull., 1899, p. 91. On tea, Kampala, *Small*; Mityana, *Hansford.*

4. Colletotrichum Capsici (Syd.) Butl. & Bisby, The Fungi of India, p. 152 (1931). On *Capsicum annuum*, Kampala, *Small 629, Hansford.*

5. Colletotrichum gloeosporioides (Penz.) Sacc., Sylloge, III, p. 735 (1884). On rough lemon, causing leaf-spot, Kampala, *Hansford.*

6. Colletotrichum Gossypii South in Journ. Mycol., VI, p. 101 (1890). On cotton-bolls, Busoga, *Snowden 459, Small 681, Hansford*: in Uganda usually limited to wet seasons.

7. Colletotrichum graminicola (Ces.) Wilson in Phytopath., IV, p. 106 (1914). On old leaves of Sorghum, Kampala, *Small, Hansford*; on *Cymbopogon Afronardus, Hansford 1256.*

8. Colletotrichum Lindemuthianum (Sacc. & Magn.) Bri. & Cav., Fung. Paras., no. 50 (1892). On species of *Phaseolus*, on old leaves and pods, *Small 669, Hansford*, common.

9. Colletotrichum Lycopersici Chester in Bull. Torr. Bot. Club, XVIII, p. 371 (1891). On *Solanum* sp., *Dummer 3066.*

10. Colletotrichum nigrum Ell. & Halst. in New Jersey Agr. Exper. Sta. Rep., 1895, p. 297. On *Capsicum frutescens*, Kampala, *Hansford.*

An old record on *Carica Papaya* (*Dummer 2138*) probably should be referred to *C. gloeosporioides.*

11. Colletotrichum theobromicola Del. in Bull. Soc. Mycol. France, XXI, p. 191 (1905). On *Theobroma cacao*, on pods, *Small 481.*

In addition to the above, cultures of *Colletotrichum* have been made in Uganda from a variety of hosts, and most have proved to be of the type of *C. gloeosporioides*; Small in Trans. Brit. Mycol. Soc., XI, p. 112, 1926, discusses the relationships of his cultures.

12. Gloeosporium albo-rubrum Petch in Ann. Roy. Bot. Gard. Perad., III, p. 8 (1906). On twigs of *Hevea brasiliensis*, Kampala, *Small.*

13. Gloeosporium Musarum Cooke & Mass. in Grevillea, XVI, p. 3 (1887). On fruits of *Musa* spp., common, *Small 336, Snowden, Hansford.*

14. Microstroma Albizziae Syd. in Ann. Mycol., X, p. 263 (1912). On leaves of *Albizzia*, Entebbe Road, *Hansford 1536.*

15. Papularia vinosa (Berk. & Curt.) Mason in List 2, ii, p. 21, Imp. Mycol. Inst., Kew (1933). On leaves of *Saccharum officinarum*, Kampala, *Hansford 1165.*

16. Pleocyta Sacchari (Mass.) Petr. & Syd. in Beih. Fedde Rep., XLII, p. 454 (1907) *Melanconium sacchari* Massee apud Speg. in Rev. Fac. Agron. y Vet., II, p. 242 (1896). On *Saccharum officinarum*, Kampala, *Small, 613.*

17. Pestalotia Aloes Trinch. in Rend. R. Accad. Sci. Napoli, 1909, extr. p. 8. On *Aloe*, Entebbe Botanic Gardens, *Hansford 1885.*

18. Pestalotia Celastri Tassi in Bull. Lab. Ort. Bot. Siena, p. 131 (1900). On *Gymnosporia senegalensis*, Kipayo, *Dummer 2513.*

19. (?) Pestalotia Guepini Desm. in Ann. Sci. Nat., ser. 2, XIII, p. 182 (1840). On *Coffea robusta*, Kampala, *Small 674.*

20. Pestalotia Palmarum Cooke in Grevillea, iv, p. 115 (1876). On *Hevea brasiliensis*, *Small 338* ; on *Anacardium*, Kampala, *Small 590*.

21. Pestalotia Theae Sawada in Spec. Rep. Agr. Exper. Sta., Formosa, xi, p. 113 (1915) ; Mycologia, ix, p. 171 (1917). On tea, Kampala, *Small 558*, *Snowden 705*.

22. Pestalotia spp. On *Antidesma*, *Hansford 1838* ; on *Pandanus*, *Hansford 1876* : on *Pennisetum purpureum*, *Hansford 1147*.

23. Cylindrosporium Sesami Hansford in Ann. Rep. Dep. Agric., Uganda, 1936, ii, p. 47. On *Sesamum indicum*, Bukalasa, *Hansford 1861*.

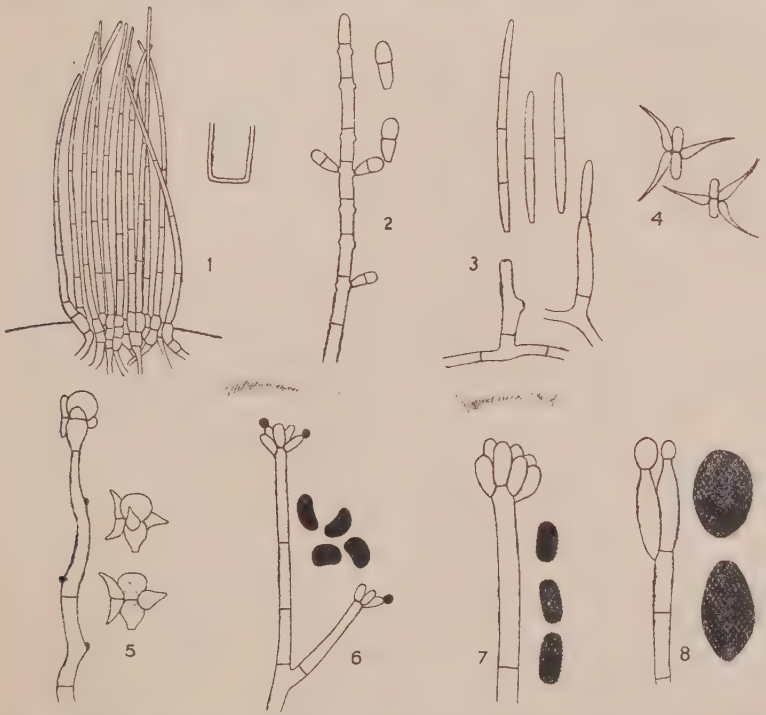

Fig. 1.—*Cylindrosporium Tephrosiae* : stroma and conidia, ×500 ; enlarged base of conidium. Fig. 2.—*Didymaria Cissampeli*, ×500. Fig. 3.—*Cercosporella Alafiae*, ×1000. Fig. 4.—*Titaea callispora*, ×500. Fig. 5.—*Titaea Ugandae*, ×500. Fig. 6.—*Stachybotrys nephrospora*, ×500. Fig. 7.—*Stachybotrys kampalensis*, ×500. Fig. 8.—*Stachybotrys Theobromae*, ×500.

24. **Cylindrosporium Tephrosiae** Hansford, sp. n. *Maculae* elongatae usque ad 3 mm. longae et 1 mm. latae, saepe confluentes, albidae vel luteae, margine brunneae. *Acervuli* epiphylli per stomata erumpentes, minuti, 20–40 μ diam., hyalini, usque ad 10 μ alti. *Conidia* parallela, erecta, filiformia, 3—5-septata, hyalina, 55—110×3 μ, ad apicem leniter attenuata.

Hab. in foliis *Tephrosiae Vogelii*, Kampala, *Hansford 1774*.

Leaf-spots lenticular, elongated between the veins of the leaflets, up to 3×1 mm., often confluent; on upper surface white to pale buff in centre, with dark brown margin; on lower surface pale brown with less conspicuous margin. Acervuli chiefly epiphyllous, emerging through the stomata, small hyaline, consisting of a dense mass of shortly septate hyphae forming a stroma in the mouth of the stoma. Conidia borne direct on the surface of the stroma: the conidiophores not differentiated, parallel, forming a dense cylindric mass erect on the stroma and up to 120 μ high; conidia white in mass. Heavy infection causes leaf-shedding (fig. 1 on p. 39.)

MONILIACEAE.

1. **Oospora Meliolae** Hansford, sp. n. *Hyphae* repentes, hyalinae, ramosissimae, indistincte septatae, 1·5–2·5 μ diam. *Conidia* pleurogena in sterigmatibus minutis, catenulata, piriformia, hyalina, levia 3×1·5 μ.

In plagulis *Meliolae* parasiticum, *Hansford 2693*.

Cultures on agar are pure white, velvety, with branched, straight or flexuous hyphae in the agar, not forming arthrospores, hyaline, 1·5–2·5 μ diam., septate at intervals and irregularly branched. The conidiophores are not differentiated from the vegetative hyphae and are mostly creeping or somewhat elevated above the agar, producing short lateral chains (up to 10 conidia) from very fine sterigmata (2×0·3 μ) either on the few terminal cells or at intervals along the hyphae; the conidia are formed in basipetal succession, giving unbranched chains. Conidia dry, elliptic-piriform, each with a truncate papillate hilum at the base, thin-walled, smooth, uninucleate, hyaline, 3×1·5 μ, broadly rounded above. The conidia are definite and not mere ends of a branched conidiophore as in the Trichophytoneae, and the sterigmata remain clearly visible on the hyphae after formation of conidia.

2. Oospora Oryzae Ferr. in Malpighia, xvi, p. 36 (1902). Laboratory weed, Kampala, *Hansford* (prox.).

3. Monilia sitophila (Mont.) Sacc., Sylloge, iv, p. 35 (1886). A common saprophyte in soil and especially on charred materials, a common laboratory weed, Kampala, *Hansford*.

M. carbonaria Cooke, previously recorded in Uganda, is included here as it appears identical.

4. Rhopalomyces elegans Corda, Pracht-Fl., p. 3 (1839). On cow-dung, Kampala, *Hansford 1177*. A form with smaller vesicles (45 μ) and spores (24—27×10—13 μ) occurred at Kampala as a mould growing on banana fibre after sterilization and exposure, probably a soil fungus.

5. Cephalosporium Lecanii Zimm. in Korte Ber. uit 'slands Plantentuin, Java, p. 2(1898). On *Lecanium* on coffee, *Hansford 802*; on *Aleyrodes* on *Elaeis*, *Hansford 817*.

6. Trichoderma viride Pers. ex Fr., Syst. Mycol., iii, p. 215 (1829). *Small 131*, Mt. Elgon; common saprophyte in soil, Kampala, *Hansford*.

7. Hyalodendron album (Dowson) Diddens in Zentralbl. für Bakt., Abt. 2, xc, p. 316 (1934). *Cladosporium album* Dowson in Journ. Roy. Hort. Soc., xlviii, p. 38 (1923). On *Vigna*, Kampala, *Hansford 1270*; on *Phaseolus*, Kampala, *Hansford* 1238. These specimens exactly resemble *Cladosporium herbarum* except that all parts remain hyaline.

8. Hyalodendron sp. Parasitic on *Elsinoe Tephrosiae* on *Tephrosia*, Kampala, *Hansford*.

9. Verticillium Dahliae Kleb. in Mycol. Centralbl., III, p. 66 (1913). Causing wilt disease of *Abroma augusta*, Kampala ; of *Manihot utilissima*, Bukalasa ; of *Gossypium hirsutum*, in many localities, *Hansford*.

10. **Verticillium epiphytum** Hansford, sp. n. *Hyphae* hyalinae, repentes, 2–3 μ crassae, ramosae, septatae. *Conidiophora* erecta, simplicia vel furcata, 20–80 μ longa, 2·5–3 μ crassa, superne attenuata, apice acuta, hyalina. *Conidia* capitata, (–20 μ diam.), hyalina, continua, bacillaria, 5—6·5 × 0·75—1 μ.

Hab. in plagulis *Helminthosporii Triumfettae*, Kampala, *Hansford 771*.

The hyphae creep over the hyphae of the *Helminthosporium* and also over the leaf and leaf-hairs of the host-plant, and with the conidiophores form a thin white growth. The latter are erect, short, simple or furcate or with a single whorl of branches, producing each a terminal head of bacillary conidia. In culture on agar the fungus produces a pure white mycelium and layer of conidiophores ; there is no coloration of the medium and no formation of sporodochia. No ascus stage has been found.

11. Physospora rubiginosa Fr., Summ .Veg. Scand., II, p. 495 (1849). On wood, Kasala Forest, *Dummer 1418* ; Entebbe, *Maitland 298*.

12. **Sporotrichum Triumfettae** Hansford, sp. n. *Hyphae* repentes, ramosae, hyalinae, 1–2·5 μ crassae, indistincte septatae, granulosae. *Conidia* acrogena et pleurogena, singula, globosa vel citriformia, hyalina verruculoso-granulosa, 3·5—5·5 × 3—4 μ.

Hab. in plagulis *Helminthosporii Triumfettae* parasiticum, Kampala, *Hansford 907*.

The fungus forms a white to greyish covering over the host fungus and extending beyond the latter over the leaf and leaf-hairs. The hyaline hyphae are faintly roughened with a granular deposit, which is more pronounced on the conidia. The latter are formed on short sterigmata which occur either singly or in small groups along the hyphae or at the ends of short branches. The conidia are spherical to citriform with a basal apiculus, hyaline, thin-walled verruculose-granular, not usually catenulate but rarely in chains of two, not forming heads. The fungus somewhat resembles the description of *Rhinotrichum gossypiense* Speg.

13. Beauveria Bassiana (Bals.) Vuill. in Bull. Soc. Bot. France, LIX, p. 40 (1912). On *Stephanoderes Hampei*, Kiagwe, *Hansford*.

14. Botrytis cinerea Pers. ex Fr., Syst. Mycol., III, 2, p. 396 (1832). On cultivated *Lilium*, causing leaf-disease, Kabale, *Hansford 2232*.

15. Botrytis vulgaris Fr., Syst. Mycol. III, 2, p. 398 (1832). On rotting seed of *Dianthus caryophyllinus*, Kampala, *Hansford*, cultured.

16. **Rhinotrichum Sonchi** Hansford, sp. n. *Plagulae* hypophyllae, rubro-brunneae, effusae, 1–5 mm. diam. ; maculae nullae. *Hyphae* repentes, septatae. *Conidiophora* erecta, dense fasciculata (–20), superne ramosa, rubro-brunnea, 80—130 × 3·5—4·5 μ, ramulis 13—30 × 4—5·5 μ. *Conidia* singula vel rarius 2–3-catenulata, globosa, rubro-brunnea, verruculosa, continua, 9–11 μ diam.

Hab. in foliis *Sonchi* sp., Kampala, *Hansford 1070*.

The fungus forms effuse dark reddish-brown patches on the lower surface of the leaf, not causing definite leaf-spots. The conidiophores are

erect on the vegetative hyphae, densely fasciculate in bundles of up to 20; branched above, primary branches in whorls of 2–3 and branching to form a head of short branchlets 13—30×4—5 μ, rounded at the ends. The conidia are formed singly or in short chains of 2–3 on the branchlets, either terminal or lateral on short warts left on the conidiophore, resembling those of some species of *Periconia* ; spherical or sometimes with a basal papilla, at first subhyaline and smooth, finally dark red-brown and verruculose, thin-walled, forming a terminal head on the conidiophore.

17. Acremonium Meliola Stevens in Bot. Gaz., lxv, p. 234 (1918). On *Meliola* spp., Entebbe Road, *Hansford 1786, 2045*.

18. **Cephalosporiopsis parasitica** Hansford, sp. n. *Mycelium* tenue, album, ex hyphis hyalinis septatis, 1·5–2·5 μ, crassis ramosis repentibus compositum. *Conidiophora* erecta, simplicia, recta, 30—40×1·5 μ, superne leniter attenuata. *Conidia* capitata (circa 6), terminalia, fusoidea, 1-septata, haud constricta, hyalina, 13—18×2·5—3·5 μ.

Hab. in foliis *Jasmini* in thyrotheciis *Lembosinae* parasitica, Entebbe Road, *Hansford 1962*.

The fungus forms a thin white covering over the thyrothecia of the host and much resembles a *Cephalosporium*, differing only in the 1-septate fusiform conidia.

19. Didymopsis Phyllachorae Syd. in Ann. Mycol., xxxvii, p. 251 (1939). On stromata of *Phyllachora* on leaves of *Harungana madagascariensis*, Gayaza, *Hansford 2344*.

20. Trichothecium roseum Link ex Fr., Syst. Mycol., iii, 2, p. 427 (1832). On leaf of *Bulbophyllum* sp., *Dummer 1198* ; cultured from surface of cotton-bolls, Kampala, *Hansford* ; on wood, *Small 475*, *Hansford 819, 9111, 167* ; occasional in soil, *Hansford*.

21. **Didymaria Cissampeli** Hansford, sp. n. *Hyphae* hypophyllae, repentes, subhyalinae vel flavido-brunneolae, septatae, 4–6 μ crassae, ramosae, leniter granulosae. *Conidiophora* erecta, simplicia, recta, septata (articulis circa 15 μ), 120—200×4 μ, basim versus flavidula, superne hyalina. *Conidia* lateralia, hyalina, ovata, 1-septata, leniter constricta, apice rotundata, basi truncata, 9—10×3·5—4·5 μ, haud catenulata.

Hab. in foliis *Cissampeli mucronatae*, Kampala, *Hansford 1308*.

Forms a thin yellowish to white mould on the lower surface of the leaf, which turns yellow to brown prior to shedding. The conidiophores are simple, straight, erect branches of the superficial hyphae of the mycelium and show slight swellings below each of the upper septa, on which whorls of 2—4-conidia are produced laterally (fig. 2 on p. 39.)

22. Arthrobotrys sp. Forms a thin mould over the substratum, with erect white to yellowish conidiophores up to 400 μ long by 5–7 μ wide, septate, simple, swollen just below each of the upper septa, the swellings bearing short sterigmata, 1—2×1 μ, on each of which a single conidium is formed. Conidia piriform with basal apiculus, broad, rounded at apex, 1-septate, slightly constricted, basal cell smaller, hyaline, smooth, 20—28×12—15 μ.

On surface of banana-fibre pots, probably a soil fungus, Kampala, July 1936, *Hansford* ; on surface of rotting stems of *Passiflora*, Bugomolo, Hoima, April, 1940, *Hansford*.

23. Eriomycopsis. A monograph of this genus, including the forms recorded in Uganda, has been published in ' Bothalia ', iv, 2, pp. 464–69 1942).

24. Piricularia grisea (Cooke) Sacc. in Michelia, ii, p. 148 (1882). For the present the forms collected in Uganda are not separated from the above, which appears to be either a very variable or a composite species. On *Setaria* sp., Entebbe Road. *Hansford 1815*, conidia 2—3-septate, 28—45×5—6 μ : on *Mariscus* sp., Kampala, *Hansford 1312*, conidia, 1—2-septate, 24—28×11—15 μ : on *Mariscus* sp., Kampala, *Hansford 1235*, conidia 15—28×5·5—7 μ, 1—3-septate : on *Panicum adenophorum*, Kampala, *Hansford 1203* : on *Tricholaena rosea*, Masinidi, *Hansford 1209* : on *Digitaria*, Kampala, *Hansford 1259*.

25. Piricularia Oryzae Cav. in Atti Istit. Bot. Pavia, ser. 2, iii, p. 280 (1894). On cultivated rice, Kampala, *Small, Snowden 679* ; Bukalasa, *Hansford* : Budama, common, *Snowden, Small, Hansford* ; on *Digitaria*, Serere, *Hansford 1634*, common : on *Eleusine coracana*, Serere, *Hansford 1635*, common.

This fungus causes the ' Blast ' disease of rice, which limits production of this crop in Uganda, and is also an important disease of *Eleusine* : on the *Digitaria* it is usually limited to leaf-spots and rare on the inflorescence.

26. **Cercosporella Alafiae** Hansford, sp. n. *Maculae* rotundatae, 5–10 mm. diam., pallide brunneae, indistincte zonatae, marginem versus brunneae. *Conidiophora* epiphylla, sparsa vel laxe aggregata, erecta ex hyphis subcuticularibus mycelii oriunda, simplicia, hyalina, continua, 10—15×2·5 μ. *Conidia* terminalia, singula, filiformia, hyalina, 0—1—3-septata, haud constricta, 12—30×1·5 μ.

Hab. in foliis *Alafiae clusioidis*, Mulange, *Dummer 4160*.

The vegetative hyphae are completely hyaline and very narrow (1—1·5 μ), septate, penetrating the whole of the leaf-tissues in the spot as well as forming a close network of hyphae either on or in the cuticle of the upper epidermis, from which the conidiophores arise (fig. 3 on p. 39.).

27. Cercosporella Gossypii Speg. Fung. Guar. Pug., i, p. 162 (1884). On cultivated cotton everywhere in Uganda, *Hansford, Snowden, Small, Dummer 1335*.

28. **Cercosporella Polysciatis** (P. Henn.) Hansford, comb. n. *Pionnotes Polysciatis* P. Henn. in Engl. bot. Jahrb. xxxiv, p. 57 (1904). *Fusariella Polysciatis* (P. Henn.) Wollenw., Fusarium autogr. del., no. 433 (1917). On leaves of *Polyscias fulva*, Entebbe Road, *Hansford 1839*.

The fungus forms loose to dense cottony patches, usually pink to red in colour, on the lower surface of the leaves, not causing definte leaf-spots. The conidia are formed in typical *Cercospora* manner on simple or branched geniculate conidiophores and are cylindric, rounded at the apex, truncate at the base, 2—7-septate, 30—80×6—7 μ. No typical sporodochia are formed, and Hennings' original description of the fungus as ' waxy ' is incorrect.

29. Helicomyces roseus Link ex Fr., Syst. Mycol., iii, index, p. 93 (1832). On *Hyparrhenia*, Kampala, *Hansford 1145*.

30. Titaea callispora Sacc. in Michelia, i, p. 73 (1879). On *Asterina* on *Solanum*, Bukalasa, *Hansford 1276* (fig. 4 on p 39). A slightly different

form with smaller conidia, with less elongate-attenuate cells, has been found at Kampala as a parasite on *Hemileia vastatrix* on *Coffea arabica*, *Hansford* !

31. **Titaea Ugandae** Hansford, sp. n. *Plagulae* albae, densae; mycelium ex hyphis hyalinis septatis dense ramosis subagglutinis 3–4 μ crassis compositum. *Conidiophora* erecta, dense fasciculata, simplicia, hyalina, septata, superne geniculata, usque ad 150×4·5 μ. *Conidia* singula, terminalia, in sterigmatibus minutis efformantia, hyalina, stellata, circa 20 μ diam., sex-cellulata; cellula basalis piriformis ad basim truncata; cellula apicalis subglobosa, cellulae laterales 4, radiatim dispositae, superne attenuato-acutae, 2 singulae et 2 in crescentiam longitudinalem conjunctae.

Hab. in plagulis *Asterinae*, Rifle Range, Kiagwe, *Hansford 2572* (typus); in *Schiffnerula* in foliis *Jasmini*, ibidem, *Hansford 2680*.

The fungus is a parasite of other leaf-fungi, but so far has not been found on *Meliola*; colonies white, dense, covering the whole of the host colony and extending beyond. The conidiophores are single erect branches from the mycelium, but are often densely crowded or fasciculate and form a layer over the whole colony; hyaline, simple, up to 150 μ long by 4·5 μ wide, septate, geniculate above at the projecting sterigmata (2×1 μ) of the old conidia. Conidia hyaline, smooth, thin-walled, produced singly at the end of the conidiophore and then becoming lateral by continued growth of the latter; each consisting of six cells, of which two form the main axis, the lower cell being truncate and attenuate towards the basal hilum, the upper almost globose. From this main axis radiate in the middle of the conidium four cells, two single and two forming a longitudinal crescent with points outwards from the main axis: these four lateral cells are approximately of equal size and are pointed at their apices (fig. 5 on p. 39).

DEMATIACEAE.

1. Papularia Arundinis (Corda) Fr., Summ. Veg. Scand., II, p. 509 (1849). On *Pennisetum purpureum*, dead stems, *Small 115*, *Dummer 151*; previously recorded as *Coniosporium inquinans* Dur. & Mont.

2. Thielaviopsis paradoxa (De Seynes) Hoehnel in Hedwigia, XLIII, p. 295 (1904). On rotting banana fruits, Mbale, *Snowden*, cultured and det. *Hansford*: on rotting sugar-cane cuttings, Lugazi, *Hansford*.

3. Pseudocamptoum fasciculatum (Cooke & Mass.) Mason in Ciferri, Micofl. Doming., Estac. Agr. Moca, ser. B, XIV, p. 155 (1929). On twigs, Nagunga, Kiagwe, *Dummer 1423*.

4. Memnoniella echinata (Riv.) Galloway in Trans. Brit. Mycol. Soc., XVIII, p. 163 (1933). On germinating rice-seed, Serere, *Hansford 1670*.

5. Acremoniella Sarcinellæ Pat. & Har. in Journ. de Bot., XIV, p. 245 (1900). Parasitic on *Sarcinella* stage of *Schiffnerula* sp. on *Pseudocedrela Kotschyi*, W. Nile, *Hansford 2241* (*leg. W. J. Eggeling*).

6. Stachybotrys atro-grisea Ell. & Ev. in Journ. Mycol., IV, p. 106 (1888). On dead wood, paper and in soil, common, Kampala, *Hansford 1388*.

7. **Stachybotrys nephrospora** Hansford, sp. n. *Hyphae* superficiales, repentes, hyalinae, septatae, ramosae, 3–4 μ crassae. *Conidiophora* erecta,

saepe regulariter alternata, hyalina, recta, simplicia, 1—3-septata, 30—120×3·5 μ, apice 3–5 phialidibus praedita ; phialides ellipsoideae saepe apice apiculatae, 6×3 μ, subhyalinae vel apice griseae. *Conidia* singula (vel catenulata ?), atra, levia, opaca, allantoidea, 8—11×4·5—6 μ, continua, capitulum efformantia.

Hab. in ramis emortuis, Kampala, *Hansford 1114* (fig. 6 on p. 39).

8. **Stachybotrys kampalensis** Hansford, sp. n. *Hyphae* steriles non visae. *Conidiophora* erecta, 150—250×8—9 μ, superne leniter attenuata (–4 μ), subhyalina vel olivacea, simplicia, recta, 4—6-septata : phialides 4–9, terminales, subhyalinae, cylindraceae vel ellipsoideae, 10—13× 5—6 μ. *Conidia* capitata, atra, opaca, oblonga, continua, 10—14×6—8 μ ; membrana granulosa.

Hab. in ramis emortuis, Kampala, *Hansford 1138* (fig. 7 on p. 39).

9. Stachybotrys alternans Bon., Handb. p. 117 (1851). On germinating rice-seed, Serere, *Hansford 1671*.

10. **Stachybotrys Theobromae** Hansford, sp. n. *Mycelium* ex hyphis hyalinis septatis ramosis repentibus 3–5 μ crassis compositum. *Conidiophora* fasciculata, erecta, circa 200 μ longa, 4–6 μ crassa, simplicia vel 2—3-furcata, hyalina, levia, septata ; phialides 1–3 clavatæ, 21—28× 27—10 μ. *Conidia* capitata, primo subhyalina, demum olivacea vel opaca vel atra, ovata vel citriformia, basi apiculata, levia, continua, 20—28× 15—18 μ.

Hab. in ramis emortuis *Theobromae Cacao*, Kampala, *Hansford 1768*.

The conidia are produced singly from the tips of the phialides and arise as an extrusion of the inner wall of the latter through a pore in the outer wall after the first formed conidium has fallen off (fig. 8 on p. 39).

11. Periconia byssoides Pers. ex Corda, Icon., I, p. 19 (1837). On coffee twigs, Kampala, *Small 29, 31* ; on dead wood Kampala, *Hansford 1136*.

12. Periconia lateralis Ell. & Ev. in Journ. Mycol., II, p. 104 (1886). On leaves of *Chloris pycnothrix*, Kampala, *Hansford 1227*.

13. Periconia pycnospora Fres., Beitr. p. 20 (1850). On dead stem of *Albizzia moluccana*, *Small 364*.

14. Nigrospora Oryzae (Berk. & Br.) Petch in Journ. Ind. Bot. Soc., IV, p. 24 (1924). On leaves of sugar cane, *Snowden 989* : cultured from soil, Kampala, *Hansford*.

15. Nigrospora sphaerica (Sacc.) Mason in Trans. Brit. Mycol. Soc., XII, p. 158 (1927). On leaves of Sorghum, *Snowden 992, 998, 1002* ; in cotton bolls, following infection by *Nematospora*, Kampala, *Hansford* !

16. Stachylidium bicolor Link ex Fr., Syst. Mycol., III, 2, p. 391 (1832). On dead wood, *Hansford 1094*, Kampala, common saprophyte.

17. Zygosporium oscheoides Mont. in Hist. nat. Cuba, p. 303 (1845). On dead leaves, Kampala, *Hansford 1255* ; Entebbe, *Hansford 1319*.

18. Cladosporium anomalum Berk. & Curt. in Journ. Linn. Soc. Lond., X, p. 362 (1869). On *Abutilon indicum*, Kampala, *Hansford 1305*.

19. Cladosporium fulvum Cooke in Grevillea, XII, p. 32 (1883). On cultivated tomatoes, Kampala, *Hansford 1297*, common in wet cool weather.

20. Cladosporium herbarum Pers. ex Fr., Syst. Mycol., III, 2, p. 370 (1832). Universal saprophyte, *Small 505, 609, 657, Hansford 1308*. On

Hemileia vastatrix on *Coffea arabica*, Kampala, *Hansford!* (*C. Hemileiae* March. and Steyaert); on *Puccinia Kraussiana* on *Smilax*, Entebbe Road, *Hansford 1541 p.p.*: on *Ravenelia* on *Albizzia zygia*, Serere, *Hansford* 1608: on *Sphaceloma* on *Citrus*, Kampala, *Hansford 1802* (*C. Citri*, Mass.): on living leaves of *Ageratum conyzoides*, Kampala, *Hansford 1044*, causing leaf-spots: on leaf-spots on *Vernonia* sp., Kampala, *Hansford 1192*: on leaf-spots on *Lantana trifolia* Kampala, *Hansford 1187*.

21. Septonema hormiscioides Petch in Ann. Roy. Bot. Gard. Perad. VII, p. 318 (1922). On dead wood, Kampala, *Hansford 1098*.

22. **Stigmina Septoidii** Hansford, sp. n. *Fungus* in *Septoidio lateritio* parasiticus: plagulae hypophyllae, velutinae, atro-olivaceae, 2–5 mm. diam. vel in confluendo majores, plus minusve effusae. *Hyphae* olivaceae, septatae, ramosae, 4μ crassae. *Conidiophora* erecta, olivacea, recta vel flexuosa, simplicia vel superne furcata, circa 60μ longa. *Conidia* olivacea, cylindracea, recta vel curvula, utrinque rotundata, 2—6-septata, rarius constricta, 20—50$\times$6—10μ.

Hab. in *Septoidio lateritio* in foliis *Sapii Manniani*, Entebbe Road, *Hansford 1749*; Kampala, *Hansford 1989*.

The fungus forms dark olivaceous velvety patches over the reddish brown *Septoidium*: the conidiophores are hardly differentiated from the mycelium and the conidia are formed by the breaking up of the distal portions and branches of the 'conidiophore' in a manner similar to *Cladosporium*, occasionally hanging together in chains of 2.

23. **Dendryphium Loranthi** Hansford, sp. n. *Plagulae* epiphyllae leniter velutinae, atro-brunneae vel atrae, orbiculares vel effusae, 1–5 mm. diam., saepe confluentes. *Hyphae* repentes, atro-brunneae, septatae, 3–4μ crassae, ramosae. *Conidiophora* erecta, 40—80$\times$3—4μ, 2—4-septata, atrobrunnea, simplicia. *Conidia* catenulata (2–3), cylindracea, utrinque rotundata vel basi truncatula, olivacea, utrinque pallidiora, levia, 1—6-septata, haud constricta, 10—25$\times$4μ.

Hab. in foliis *Loranthi*, Banda, Kiagwe, *Dummer 1466*: Entebbe Road, *Hansford 2110*.

The conidia are formed in terminal unbranched chains on the erect conidiophore. The fungus is often associated with *Meliola* and similar leaf fungi, but in some colonies no second mycelium has been seen; it is possible that it is a hyperparasite on other leaf fungi.

24. **Heterosporium Adeniae** Hansford, sp. n. *Maculae* nullae; plagulae atro-olivaceae, effusae, velutinae, hypophyllae, 1–6 mm. diam. vel confluendo majores. *Hyphae* atro-brunneae, septatae, 3μ crassae, repentes, ramosae. *Conidiophora* erecta, atro-brunnea, plus minusve flexuosa, septata, 100—200$\times$4μ, plerumque simplicia, superne nodulosa conidiiferaque. *Conidia* acro-pleurogena, singula vel rarius 2-catenulata, cylindracea, apice rotundata, basi rotundata vel rarius truncatula, atro-brunnea, 1–6-septata, haud constricta, verruculosa, 22—65$\times$5—7μ.

Hab. in foliis *Adeniae cissampeloidis*, Kipayo, *Dummer 2502*: Rifle Range, Kiagwe, *Hansford 2437*.

The fungus is a definite leaf parasite and causes some shedding of the yellowed leaves: the conidial scars are usually restricted to the terminal cell of the conidiophore on which they are rather closely crowded.

25. Heterosporium echinulatum (Berk.) Cooke in Grevillea, v, p. 123 (1877). On leaves of *Dianthus caryophyllinus*, Kampala, *Hansford*! common.

26. Heterosporium lagunense Syd. in Ann. Mycol., xviii, p. 104 (1920). On dead stems and pods of *Canavalia ensiformis*, Kampala, *Hansford 1779*.

27. Dendryphiella interseminata (Berk. & Rav.) Bubák and Ranoj. in Ann. Mycol. Berl., xii, p. 417 (1914). On leaves of *Phormium tenax*, Entebbe Botanic Gardens, *Hansford 1877*.

Forms dark brown to black patches on dead areas of the leaf, especially hypophyllous. Conidiophores dark reddish brown, septate, erect, swollen below each septum (–8 μ); conidia terminal, becoming lateral through extension of axis, which may be bilateral giving a cymose branching; 130—180 × 4—5 μ. Conidia dark reddish brown, cylindric, 3-septate, often slightly constricted, rough walls, single or in chains of 2–3, scars flattened, 24—30 × 6·5—8 μ.

28. **Brachysporium Acanthi** Hansford, sp. n. *Maculae* primo flavidulae, demum majores griseo-brunneae, margine flavidae; hypophyllae effusae, 1–20 mm. diam., velutinae, demum atro-brunneae arescentes. *Conidiophora* hypophylla erecta, brunnea, simplicia vel irregulariter ramosa, flexuosa, superne pallidiora geniculataque, 120—200 × 4 μ. *Conidia* hyalina vel brunneola, elongato-ovata vel cylindracea, utrinque rotundata, 1—3-septata, haud constricta, levia 23—34 × 7—10 μ.

Hab. in foliis vivis *Acanthi* spec., Kampala, *Hansford 1268*.

The conidia are produced singly on the apex of the conidiophore, which grows past the scar to form others.

29. Curvularia geniculata (Tracy & Earle) Boedijn in Bull. Jard. Bot. Buitenzorg, ser. 3, xiii, p. 120 (1933). On germinating rice seed, Serere, *Hansford 1673*.

30. Curvularia lunata (Wakker) Boedijn, loc. cit. Common on sugarcane and other Gramineae, Kampala, *Hansford*.

31. Helminthosporium capense Thuem. in Flora, lix, p. 570 (1876). *Cercospora capensis* (Thuem.) Sacc., Sylloge, iv, p. 469 (1886). This is a parasite of species of *Meliola* and of its segregates *Irene*, *Irenina* and *Irenopsis*, common in Uganda, e.g., Hansford *1357*, *1367*, *1793*, *2133*, *2426* and many others. It was first described as a parasite on the leaves of *Cunonia* and of *Osyris* from S. Africa, but inspection of the original collections has shown that in both instances it was growing directly on Meliolines on these two hosts. The synonymy cited below is based mainly on specimens and preparations in the herbarium of the Imperial Mycological Institute, Kew, where it has been known for some time under the name of *H. Coffeae* Mass. The various reputed species were indifferently described as growing directly on the leaves of the host plant, as a conidial stage of a *Meliola*, or as a parasite of a *Meliola*, and then, with one exception, associated with a single flowering plant genus.

Helminthosporium fumosum Ell. & Mart. in Amer. Natur., xviii, p. 70 (1884). *Brachysporium fumosum* (Ell. & Mart.) Sacc., Sylloge, iv, p. 478 (1886). On a Melioline on *Persea*, New Jersey, U.S.A.

H. Coffeae Mass. in Kew Bull., 1901, p. 167, on a Melioline on *Coffea*, Gold Coast.

H. melioloides Sacc.i n Atti Accad. Veneto-trent. Istria, x, p. 89 (1917). On a Melioline on *Uvaria*, Philippines.

H. philippinum Sacc. in Atti Accad. Veneto-trent. Istria, x, p. 89 (1917). On a Melioline on *Arenga*, Philippines.

H. ficinum Sacc. in Atti Accad. Veneto-trent. Istria, x, p. 90 (1917). On a Melioline on *Ficus*, Philippines.

H. ficuum Yates in Phil. Journ. Sci. XIII, p. 382 (1918). On a Melioline on *Ficus*, Philippines. (Sydow in Ann. Mycol., XXI, p. 73, 1922, states that *H. ficuum* Yates is a synonym of *H. ficinum* Sacc.)

H. flagellatum Yates in Phil. Journ. Sci. XIII, p. 383 (1918). On a Melioline on *Ardisia*, Philippines.

H. glabroides Stev. in Bot. Gaz. LXV, p. 240 (1918). Type on *Meliola glabra* Stevens, but also recorded on several other species on various host plants. Porto Rico. Stevens later cited Kalchbrenner 1256 from S. Africa as this species: inspection of Kalchbrenner's collection shows that it is *H. capense*. Sydow's re-description of *H. glabroides* in Ann. Myc. XXVII, p. 148, 1929, also applies closely to many collections of *H. capense*.

H. guareicola Stev. in Bot. Gaz. LXV, p. 241 (1918). On a Melioline on *Guarea*, Porto Rico. Stevens 8096 in Herb. Kew. is on the type host, and is *H. capense* with the spiral-nodulose type of conidiophore.

H. spirotrichum Sacc. in Bol. Ort. Bot. Napoli, VI, p. 61 (1918). On a Melioline on *Cyrtophyllum*, Singapore.

This again shows the spiral-nodulose type of conidiophore, mixed in some colonies with the straight type.

H. carpocrinum Cif. in Ann. Mycol. XXXVI, p. 237 (1938). On a Melioline on *Omphalea*, Dominican Republic.

? *H. palmetto* Gerard in Grevillea, XVII, p. 68 (1889). On a Melioline on *Palmetto*, Louisiana, U.S.A. The specimen in Herb. Kew. shows an entirely similar fungus, but only three septate conidia could be found.

Finally, a specimen of *H. capense* was issued by Zenker in his 'Flora von Kamerun', no. 1689, under the name of *H. camerunense* P. Henn., which has remained a *nomen nudum*. Zenker collected it at Bifindi, Cameroons, W. Africa. The host-plant is not given.

In addition to the above, the descriptions of about 25 further reputed species mainly distributed in *Helminthosporium*, but also in *Brachysporium*, *Clasterosporium*, *Cercospora* and *Napicladium*, suggest that they may be the same species. In the absence of authentic material, however, they are not listed.

For purposes of reference it is well to give a re-description of *H. capense* to include the forms mentioned above.

Leaf-spots none; parasitic on *Meliola* and other leaf fungi; mycelium creeping amongst those of the host, pale brown 2·5–4 μ wide, ramose-reticulate, not covering the host hyphae, indistinctly or distinctly septate, straight-walled, smooth. Conidiophores erect, usually more or less fasciculate, often in dense caespituli up to 1 mm. diam., cylindric, straight or sub-straight or in some forms regularly flexuous-spiral above, more or less nodulose-geniculate at the conidial scars, darker than the mycelium, septate, up to 400×5—$8\,\mu$, apex blunt and often pale. Conidia when young ovate to obovate and sometimes with granular-rough walls, 0–3-septate; mature conidia with apex more or less prolonged into a beak and

then obclavate, 3—5-septate, not constricted, smooth, olivaceous to brown, paler at the ends, base truncate, apex attenuate-rounded, walls often thickened in middle part, 20—70×6—13 μ; many old conidia collapse and have longitudinal ridges, appearing narrower than normal.

32. HELMINTHOSPORIUM CASSIICOLA Berk. & Curt. in Journ. Linn. Soc. Lond. Bot., x, p. 361 (1869). On wood, Mabira Forest, *Maitland 18*; Mugomba Forest, *Maitland 410*.

33. HELMINTHOSPORIUM CYNODONTIS Marig. in Microm. di Schio, p. 27 (Schio, 1909). On *Cynodon* sp., Karamoja, *Hansford 1465* (*leg. Liebenberg*).

34. **Helminthosporium Euphorbiae** Hansford, sp. n. *Maculae* olivaceo-brunneae vel atrae, orbiculares, 1–4 mm. diam., arescentes. *Conidiophora* amphigena, numerosa, fasciculata, erecta, subrecta, olivacea, 120—160×7 μ superne geniculata. *Conidia* ellipsoidea vel sub-cylindracea, utrinque rotundata, apice sub-attenuata, olivacea, 5—10-septata, haud constricta, 50—130×13—18 μ, plerumque 7—8-septata, 75–110 μ longa.

Hab. in foliis *Euphorbiae* (*heterophyllae* ?), Kampala, *Hansford 1230*.

35. HELMINTHOSPORIUM GIGASPORUM Berk. & Br. in Journ. Linn. Soc. Lond. XIV, p. 98 (1875). On dead wood, Kampala, *Small 64*, *Hansford 115*. On dying stems *Crotalaria juncea*, Kampala, *Hansford 1902*. On living leaves of cultivated *Verbena*, Kampala, *Hansford 1806*, causing leaf-spots.

36. **Helminthosporium Helianthi** Hansford, sp. n. *Maculae* atro-brunneae, zonatae, in centro cinerescentes, usque ad 10 mm. diam., orbiculares, saepe confluentes. *Conidiophora* praecipue epiphylla, fasciculata, olivacea, geniculata, simplicia, 2—5-septata, 70—120×8—10 μ. *Conidia* elongato-ellipsoidea, olivacea, 2—8-septata, haud constricta, 30—90× 11—16 μ.

Hab. in foliis *Helianthi annui*, Kampala, *Hansford 910*.

The conidia are straight, rounded at the base with the hilum entirely within the curve of the basal cell, slightly more attenuate but rounded at the apex, of even diameter through most of their length.

37. **Helminthosporium Kyllingae** Hansford, sp. n. In frumentis plagulam olivaceam efformans. *Conidiophora* fasciculata, atro-olivacea, erecta, simplicia, 2—4-septata, superne geniculata, 50—75×4—6 μ. *Conidia* primo terminalia, demum lateralia, cylindracea, atro-olivacea, utrinque pallidiora, apice rotundata vel hemispherica, basi rotundata hilo plano praedita, levia, 3—4-septata, haud constricta, 25—37×7—10 μ.

Hab. in frumentis *Kyllingae*, Kampala, *Hansford 1491*.

The fungus attacks the seeds of the host, first turning them yellow to orange and then covering the whole fruiting spike with a dense olivaceous layer of conidiophores and conidia.

38. HELMINTHOSPORIUM LEUCOSTYLUM Drechsler in Journ. Agr. Res., XXIV, p. 711 (1923). On *Eleusine coracana*, *Snowden 1005*, *1224*; Serere, *Hansford*, common, causing leaf-spot, foot-rot and ear disease. On *E. indica*, Lumbwa, Kiagwe, *Dummer 3232*.

39. HELMINTHOSPORIUM MACROCARPUM Grev. ex Fr., Syst. Mycol., III, 2, p. 356 (1832). On bark, with nest of the bee *Xylocopa flavorufa* DC., Butiti, Toro, 4,500 ft., *Abruzzi Expedition*.

40. **Helminthosporium Musae-sapientum** Hansford, sp. n. *Maculae* atro-brunneae, in centro cinerescentes, sub-zonatae, ovales, 10–15 mm.

longae, saepe confluentes. *Conidiophora* erecta, olivacea, geniculata, septata, 70—250 × 9—12 μ, simplicia. *Conidia* olivacea, recta vel curvula, ellipsoidea vel sub-cylindracea, utrinque rotundata, 4—12-septata, haud constricta, 55—135 × 16—27 μ.

Hab. in foliis *Musae sapientum*, Bukalasa, *Hansford*; Kampala, *Small 168*.

The fungus is quite distinct from *H. torulosum* Ashby, which forms similar leaf-spots on banana leaves. Curzi in Rend. R. Accad. dei Lincei, ser. 6, XIV, p. 148, describes "macrospores" of his *H. gibberosporum* (*Curvularia lunata*) on banana in Somaliland, as 5—9-septate, 55—87 × 12—15 μ; it is possible that these belong to the species described above. Many conidia are noticeably wider in the middle than towards the ends and in such there may be slight constriction at one or more septa; the basal hilum is small and rounded, not projecting.

[41. HELMINTHOSPORIUM NODULOSUM Berk. & Curt. The writer gave (in E. Afr. Agric. Journ., III, p. 321; 1938) the above as the name of the second *Helminthosporium* causing disease of *Eleusine coracana* in Uganda; later information indicates that this determination is incorrect and that the *Eleusine* fungus belongs to the *H. gigasporum* group of species.]

42. HELMINTHOSPORIUM ORYZAE v. Breda in Bull. Inst. Bot. Buitenzorg, VI, p. 11 (1900). On cultivated rice, Budama, *Snowden 679 p.p.*; Kakumiro, *Small 602*.

43. HELMINTHOSPORIUM PANICI van Overeem in Bull. Jard. Bot. Buitenzorg, ser. 3, VII, p. 431 (1925). On *Panicum maximum*, Kampala, *Hansford 1233*.

44. HELMINTHOSPORIUM RAVENELII Curt. in Grevillea, III, p. 102 (1875). On *Eragrostis* sp., Lumbwa, Kiagwe, *Dummer 3005*; on *Sporobolus* sp., *Hansford 1009* (*leg. Liebenberg*).

45. HELMINTHOSPORIUM SACCHARI Butl. in Mem. Dep. Agr. India, Bot. Ser., VI, p. 204 (1913). On sugar-cane, *Snowden 720*.

46. HELMINTHOSPORIUM SOROKINIANUM Sacc. in Zeitschr. Pflanzen-kr., I, p. 236 (1891). On wheat, *Snowden 661, 998, Small 588*: on maize, Masindi, *Hansford 1010*.

Drechsler states that Snowden's report of *H. Sorokinianum* on wheat 'may plausibly be interpreted as referring to *H. sativum*.'

47. HELMINTHOSPORIUM TRIUMFETTAE P. Henn. in Engl. bot. Jahrb., XXVIII, p. 329 (1900). On *Triumfetta* sp., Kampala, *Hansford 906, 1075, 1794*.

48 HELMINTHOSPORIUM TURCICUM Pass. in Bull. Comiz. Agr. Parmense 1876, no. 10. On maize, Bukalasa, *Small 581*: on sorghum, Kampala, *Hansford 1321*.

49. **Helminthosporium Tylophorae** Hansford, sp. n. *Hypophylla* effusa, olivacea: conidiophora dense fasciculata (—20), leniter flexuosa, simplicia vel rarius furcata, nodulosa, septata, 100—240 × 5—6 μ. *Conidia* olivacea, cylindracea, apice attenuato-rotundata, basi truncatula, 3—7-septata, 35—65 × 4—5 μ, saepe curvula.

Hab. in foliis *Tylophorae*, Entebbe Road, *Hansford 1814, 2351*.

The fungus causes no definite leaf-spots, though irregular yellow-green areas occur on the upper surface of old infections: on the lower surface it forms a dense layer of conidiophores often covering most of the leaf. The fungus is closely allied to *H. Triumfettae*.

50. Tetraploa aristata Berk. & Br. in Ann. Nat. Hist., ser. 2, v, p. 459 (1850). On dead culms of *Hyparrhenia*, Kampala, *Hansford 1108*; of *Pennisetum purpureum*, Kampala, *Hansford 1148*; of *Trichopteryx*, *Hansford 1434*.

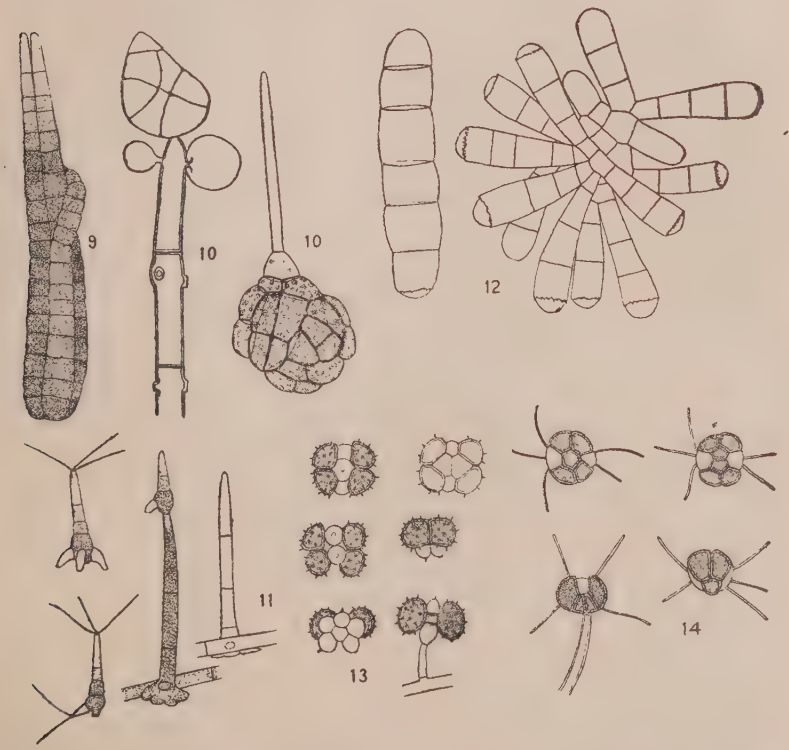

Fig. 9.—*Speira ugandensis*, ×500. Fig. 10.—*Dactylosporium Hibisci*, ×500. Fig. 11.—*Teratosperma Anacardii*, ×500. Fig. 12.—*Camptomeris Tephrosiae*, ×500; conidium, surface view of sporodochium. Fig. 13.—*Spegazzinia Meliolae*, ×500. Conidia: A, top view; B, horizontal optical section; C, bottom view; D, end view; E, vertical optical section, transverse; F, side view. Fig. 14.—*Spegazzinia Chandleri*, × 500. Conidia: A, top view; B, bottom view; C, side view; D, end view.

51. **Speira ugandensis** Hansford, sp. n. *Hyphae* repentes, atro-brunneae, septatae, 2·5–3·5 μ crassae, reticulatae. *Conidiophora* sparsa, erecta, simplicia, 35—50×7—11 μ, 2—7-septata, saepe constricta, opaca, atra. *Conidia* singula terminalia, cylindraceo-obclavata, atro-olivacea, 100—130×16—19 μ, ad apicem leniter attenuata (—10 μ), ex catenulis (3)–4–(5) simplicibus cellularum 5–10 μ longarum usque ad 8 μ diam. composita.

Hab. in ligno emortuo, Masaka Road, *Hansford 2068*.

The conidiophores are scattered over the colony, each arising from a swollen foot-cell of the mycelium, erect, opaque black, and each producing a single terminal conidium which leaves a flat projecting semi-transparent scar on the conidiophore. Conidia each composed of 4 (3–5) parallel chains of cells, more or less strongly attached to each other, cruciate in transverse section, long cylindric-obclavate, widest in basal third, slightly constricted at the cross septa which are usually continuous through the 4 chains of cells. The conidia develop as an outgrowth of 4 cells on the end of the conidiophore and further growth is apical, the cells being cut off from the apical cell of each chain, enlarging and becoming darker as they reach their mature size. Rarely one or more of the chains is loose and irregularly bent around the others (fig. 9 on p. **51**).

52. Speira toruloides Corda, Icones, I, t. 140 (1837). On dead culms of *Pennisetum purpureum*, Kampala, *Hansford 1150*.

53. Speira punctulata Cooke & Ell., var. latebrosa Bizz. in Atti R. Istit. Venet. Sc. Lett. ed Arti, ser. 6, III, p. 308 (1885). On roots of *Phaseolus*, probably a soil organism, *Hansford 1373*.

54. Sporodesmium Bakeri Syd. in Ann. Mycol. Berl., XII, p. 204 (1914). On dead leaves of Liliaceous plant, Entebbe Botanic Gardens, *Hansford 1319*.

55. Clasterosporium maydicum Sacc. in Nuovo Giorn. Bot. Ital., N.S., XXIII, p. 213 (1916). On leaves of *Sorghum verticilliflorum*, Kampala, *Hansford 1058*.

56. (?) **Dactylosporium Hibisci** Hansford, sp. n. *Hyphae* hypophyllae effusae, olivaceae, 4 μ crassae, septatae, flexuosae. *Conidiophora* erecta, simplicia, olivacea, superne pallidiora, recta, septata, 200—350 × 7—8 μ. *Conidia* subcapitata, irregulariter obovata, olivacea, apice caudata (cauda 30—60 × 3—4 μ pallidiora), dilute olivacea, verrucoso-granulosa, muriformia, in maturitate 30–40 μ longa et 25–35 μ diam.

Hab. in foliis *Hibisci calyphylli*, Entebbe Road, *Hansford 2101* (*leg. P. Chandler*).

The fungus forms effuse mouldy patches on the lower leaf surface. The conidiophores arise singly or rarely in pairs from a dark brown thick-walled smooth enlarged 'foot cell' of the mycelium. The conidia are formed on short blunt sterigmata 1 μ high by 3–4 μ diam. arranged in whorls of 3–4 just below each of the upper septa of the conidiophore and around the apex; each sterigma forms a single conidium which arises as a globular swelling soon cut off by a septum, enlarging and becoming muriform with a terminal beak. The cells of the body of the mature conidium are swollen and the conidia very closely resemble those of *Alternaria* but are not catenulate. The choice of a genus for this fungus is a matter of great difficulty (fig. 10 on p. **51**).

57. Stigmella Sacchari Speg. in Rev. Fac. Agron. y Vet., La Plata, II, p. 251 (1896). On sugar cane, Kampala, *Hansford 1164*; on germinating rice seeds, Serere, *Hansford 1672*; cultured from parasitized colony of *Meliola*, Kampala, *Hansford 2694*.

58. **Alternaria Bauhiniae** Hansford, sp. n. *Maculae* brunneae, in centro cinerescentes, atro-punctatae. *Conidiophora* fasciculata ex stomatibus folii, ex stromatibus olivaceis immersis oriunda, 20–60 × 3·5—4·5 μ, erecta, simplicia, 1–2-septata, olivacea, leniter flexuosa. *Conidia* acro-pleurogena, elongato-obclavata, olivacea, superne pallidiora,

4—11-septata, leniter constricta, cellulis majoribus longitudinaliter 1-septatis, basi attenuato-rotundata hilo plano praedita, apice in caudam attenuata, 25—80×6—10 μ.

Hab. in foliis *Bauhiniae*, Mabira Forest, *Dummer 2894*.

The leaf-spots are light brown with a grey centre on the upper surface and show as light areas on the lower side of the leaf; on the upper side the margin is light brown and sometimes slightly raised, the central region being covered with minute black dots. The fungus grows in the mesophyll and palisade layers of the leaf, at intervals forming a pseudo-parenchymatous stroma above the palisade tissue and finally bursts through the upper epidermis as a compact bundle of short conidiophores 50–80 μ in diam. The conidia are originally terminal and have not been catenulate; the fungus is here placed in *Alternaria* owing to the shape and septation of the beaked conidia, though the truncate base and narrow diameter of these separate it from most species of this genus. Except for the longitudinal septa found in half the conidia examined, the fungus might well be placed in the *Cercospora-Helminthosporium* complex.

59. Alternaria Citri Pierce in Bot. Gaz., xxxiii, p. 234 (1902). On leaves of lemon, Kampala, *Hansford 1289*; on grape-fruit, *Hansford 1397*; on Seville orange, *Hansford 1804*.

60. Alternaria crassa (Sacc.) Rands in Phytopath., vii, p. 337 (1917). On *Datura*, Kampala, *Hansford 1204*.

61. Alternaria gossypina (Thüm.) Hopkins in Trans. Brit. Mycol. Soc., xvi, p. 136 (1931). On leaves of cotton, Serere, 1934, *Hansford*, also Kampala, 1936.

62. Alternaria longipes (Ell. & Ev.) Mason in List II, i, p. 19, Imp. Bur. Mycol. (1928). Causing large leaf-spots on tobacco, Bukalasa, July 1936, *Hansford*.

63. Alternaria macrospora Zimm. in Ber. Land. u. Forstw. k. Gouv. Deutsch-Ostafr., ii, p. 24 (1904). On leaves of cotton, *Small 690*, *Snowden 972 p.p.*, *992*, *Hansford 779*; from stained cotton lint, cultured, March 1927, *Hansford*. On *Sesamum indicum*, Bukalasa, *Small 691*.

64. Alternaria oleracea Milbraith in Bot. Gaz. lxxiv, p. 321 (1922). On cabbage, Kampala, *Small 324*, *Dummer 1499*, *Hansford 1089*.

Previously reported as *A. circinans* (Berk. & Curt.) Bolle.

65. **Alternaria Ricini** (Yoshii) Hansford, comb. n. *Macrosporium Ricini* Yoshii in Bull. Sci. Fak. Terkult. Kjusu Univ., iii, p. 327 (1929). On *Ricinus communis*, Kampala, *Hansford 8561*; this material corresponds closely to the description given in Rev. Appl. Mycol., ix, p. 610; the conidia are occasionally 2-catenulate.

66. Alternaria sesamicola Kawamura in Fungi (Nippon Fungol Soc.) i, p. 28 (1931). On stems of *Sesamum indicum*, Kampala, *Hansford*.

This differs from *A. macrospora*, often found on this host, in larger and wider conidia often constricted at the septa, and with rather wider, very long beaks.

67. Alternaria Solani (Ell. & Mart.) Sorauer in Zeitschr. für Pflanzenkr., vi, p. 6 (1896). On leaves of *Solanum tuberosum*, *Snowden*, *Hansford*, *1295*.

? On leaves of *Datura Stramonium*, *Small 173*.

68. Alternaria sp. cf. *A. Solani*. On jute, Bukalasa, *Small 610*; on *Ipomoea*, Kampala, *Hansford 1190*.

69. Alternaria Sonchi Davis apud Elliott in Bot. Gaz., lxii, p. 416 (1916). On *Sonchus*, Kampala, *Hansford 913, 1067, 2540*.

70. Alternaria tenuis auct. (vide Wiltshire in Trans. Brit. Mycol. Soc., xvii, p. 157, 1933). On leaves *Dianthus caryophyllinus*, Kampala, *Hansford 1039*; on *Sorghum barbuda*, *Snowden 999*; on leaf-spots on *Centrosema pubescens*, Kampala, *Hansford*; on dead stem *Ricinus*, Kampala, *Hansford 1117*; on dead wood, Kampala, *Hansford 1168*.

71. Xenosporella Berkeleyi (Curt.) Linder in Ann. Missouri Bot. Gard., xvi, p. 318 (1929). On dead culm *Pennisetum purpureum*, Kampala, *Hansford 1149*.

72. **Tripospermum Eggelingii** Hansford, sp. n. *Mycelium* ex hyphis demateoideis olivaceis septatis spiculato-echinulatis irregulariter ramosis exhyphopodiatis saepe parallelis 4–10 μ crassis compositum, plagulam atram effusam efformans. *Conidia* stauriformia, olivacea: radii 4, 3—5-septati, circa 40 μ longi, ad septa constricti, basi 9–11 μ crassi, superne attenuati, leves.

Hab. in foliis *Fici* indet., West Nile, *Hansford 2242* (*leg. W. J. Eggeling*).

The fungus forms a black sooty covering over the upper surface of the leaf. The conidiophores are not differentiated from the demateoid olivaceous mycelium which is covered with spicules. The conidia have a 1-celled stalk portion, from the top of which 4 arms radiate, each consisting of a single row of cells.

73. Tripospermum sp. On leaves of *Annona muricata*, Kampala, *Hansford 1362*. The conidia of this material are narrower and longer than in *T. Eggelingii*, 30—80 × 6—8 μ.

74. **Teratosperma Anacardii** Hansford, sp. n. *Plagulae* epiphyllae, atro-olivaceae, 1–5 mm. diam.; mycelium ex hyphis rectis brunneis 3 μ crassis septatis exhyphopodiatis ramosis compositum. *Conidiophora* erecta, atro-brunnea, 2—3-septata, simplicia, recta, 50 μ longa et 4–4·5 μ crassa. *Conidia* singula, terminalia, stauriformia; axis princeps ex cellulis 3–4 compositus, obclavatus, apice setis 3–7 hyalinis filiformibus 10—25 × 0·25 μ praeditus. *Cellula* basalis vel sub-basalis cellulis sub-hyalinis reflexis 1–3 continuis 5–10 μ longis attenuatis praedita.

Hab. in foliis *Anacardii occidentalis*, Kampala, *Hansford* 1831.

The fungus forms rounded colonies on the upper leaf surface. The conidiophores are scattered, produced laterally on the mycelium and provided with a flattened irregularly lobed foot cell about 10 μ diam., simple, erect, dark brown, 2—3-septate, about 50 × 4—4·5 μ, each forming a single terminal conidium attached by a flattened hilum. The main axis of the conidium is obclavate, consisting of a row of 3–4 cells attenuate towards the paler apex which is furnished with 3–7 long filiform solid radiating setae. Similar setae are sometimes found on the branches of the conidium, which are single cells arising from the lower cells of the axis and are usually reflexed, subhyaline and attenuate to the apex. The conidia are very variable, depending on the development of the lateral cells which are 1–4 in number (fig. 11 on p. 51).

75. Cercospora Anethi Sacc. in Nuovo Giorn. Bot. Ital., N.S. xxiii, p. 219 (1916). On *Anethum graveolens*, Kampala, *Hansford 1481*.

It was published as *Cercospora* (*Cercosporina*) *Anethi* Sacc.

76. Cercospora atrocincta Heald & Wolf in Mycologia, III, p. 14 (1911). On *Zinnia elegans*, common everywhere in Uganda, *Hansford* !

77. **Cercospora Butyrospermi** Hansford, sp. n. *Maculae* minutae, 0·1 mm. diam., hypophyllae, rarius amphigenae, purpureae, rotundatae, emarginatae. *Conidiophora* ex stromate in stomatibus folii immerso oriunda, simplicia, fasciculata, olivacea, 0—1-septata, 10—25×5—6 μ. *Conidia* singula terminalia, irregulariter cylindracea, curvula vel recta, 3—8-septata, haud constricta, ad apicem leniter attenuata, medio olivacea, utrinque pallidiora, 35—70×7—9 μ.

Hab. in foliis *Butyrospermi Parkii*, Serere, *Hansford 1611*.

The stroma and conidiophores simulate a poorly developed acervulus or sporodochium, with the very short conidiophores on its upper surface. The conidia are single and terminal, olivaceous and widest in the middle, attenuate to the paler rounded apex and to the base ; the latter is flattened when first separated from the conidiophore but later becomes rounded by the swelling of the internal wall layer through the broken outer wall, which remains as an indistinct ring around the base.

78. **Cercospora Alectrae** Hansford, sp. n. *Maculae* nullae. *Hyphae* hypophyllae plagulas effusas olivaceas efformantes. *Conidiophora* olivacea, erecta, 3—6-fasciculata, ex stromatibus minutis in stomatibus folii immersis oriunda, simplicia vel irregulariter ramosa, multi-septata, haud constricta, superne geniculata nodulosaque, 150—300×4—6 μ. *Conidia* cylindraceo-fusoidea, subrecta, subhyalina, haud constricta, 0—3-septata, utrinque rotundata, acro-pleurogena, 20—30×4—5 μ.

Hab. in foliis *Alectrae*, Kampala, *Hansford 1307*.

The fungus forms dark olive-green patches on the lower surface of the leaves ; the conidia resemble those of *Cladosporium* but are not catenulate.

79. Cercospora Amaranthi Lobik in Morbi Plant., XVII, p. 157 (1928). On *Amaranthus* sp., Bukalasa, *Hansford 1277*.

80. Cercospora arachidicola Hori in Ann. Rep. Nishigahara Exp. Sta. Tokyo, 1917, p. 26. On *Arachis hypogaea*, Serere, *Hansford*, common.

81. Cercospora Arisaemae Tai in Bull. Chinese Bot. Soc., II, p. 47 (1936). On *Arisaema*, Mt. Elgon, *Hansford 1735*.

82. Cercospora Boehmeriae Peck in 34th Ann. Rep. State Mus. Nat. Hist., p. 48 (1883). On *Boehmeria nivea*, Kampala, *Hansford 1778*.

83. Cercospora brassicicola P. Henn in Engl. bot. Jahrb., XXXVII, p. 166 (1905). On *Brassica* spp., Kampala, *Hansford 1282*, *1296*.

84. Cercospora Cajani P. Henn. in Hedwigia, XLI, p. 309 (1902). On *Cajanus*, Kampala, *Hansford* ; common.

85. Cercospora canescens Ell. & Mart. in Amer. Naturalist, XVI, p. 1003 (1882). On *Phaseolus*, Kampala, *Hansford 1082* ; on *Crotalaria*, Kampala, *Hansford*. (?) On *Voandzeia subterranea*, Kampala, *Snowden 668*.

86. **Cercospora Chandleri** Hansford, sp. n. *Hyphae* in mycelio *Asterinae* (?) parasiticae, repentes, olivaceae, reticulato-ramosae, plus minusve flexuosae, 2–3 μ crassae, indistincte septatae. *Conidiophora* laxe dispersa, erecta, atro-brunnea, simplicia vel irregulariter 2-furcata, plus minusve flexuosa, levia vel granulosa, septata, usque ad 300 μ longa, 3–4 μ crassa,

superne pallidiora et nodulosa. *Conidia* filiformia, dilute olivacea vel brunnea, acrogena, apice leniter attenuata obtusa, basi rotundata vel truncatulata 2—10-septata 25—200×3—4 μ, interdum granulosa.

Hab. in mycelio *Asterinae* (?), in foliis *Pseudospondiadis microcarpae*, Kampala, *Hansford 2532* (*ex P. Chandler 2534*).

87. Cercospora cannabina Wakef. in Kew Bull., 1917, p. 314. On *Cannabis sativa*, *Dummer 1320*.

88. Cercospora Cassiae P. Henn. in Bull. Herb. Boissier, I, p. 121 (1893). On *Cassia*, Kampala, *Hansford 2531* (*leg. P. Chandler*); Serere, *Hansford 1584*.

89. Cercospora Chevalieri Sacc., Sylloge, XXII, p. 1431 (1913). On *Amorphophallus*, *Dummer 2879*.

90. Cercospora Cinchonae Ell. & Ev. in Journ. Mycol., III, p. 17 (1887). On *Cinchona*, Entebbe, *Hansford*.

91. Cercospora citrullina Cooke in Grevillea, XII, p. 31 (1883). On *Cucurbitacea* indet., Kampala, *Hansford 1194*.

92. Cercospora coffeicola Berk. & Cooke in Grevillea, IX, p. 99 (1881). On *Coffea arabica*, Entebbe, *Hansford 1832*; common.

93. Cercospora concors (Casp.) Sacc., Sylloge, IV, p. 49 (1886). On *Solanum tuberosum*, Mbale, *Hansford*.

94. Cercospora contraria Syd. in de Wildeman, Fl. Bas et Moyen-Congo, III, extr. p. 21 (1909). On *Dioscorea* sp., Kampala, *Hansford 2095*; Entebbe Road, *Hansford 2102 a*.

95. **Cercospora corniculatae** Hansford, sp. n. *Maculae* dilute brunneae, orbiculares, 2–8 mm. diam., arescentes. *Conidiophora* fasciculata (3–10), amphigena, brunnea, erecta, geniculata, usque ad 150 μ alt., 4–5 μ crassa. *Conidia* filiformia, plus minusve curvata, hyalina, indistincte septata, 120—220×3—3·5 μ, superne attenuata (—1 μ).

Hab. in foliis *Oxalidis corniculatae*, Kampala, *Hansford 1267*.

96. Cercospora cruenta Sacc. in Michelia, II, p. 149 (1879). On *Vigna sinensis*, Kampala, *Hansford 1258*.

97. Cercospora Demetrioniana Wint. in Hedwigia, XXIII, p. 170 (1884). On *Crotalaria juncea*, Serere, *Hansford 1492*.

98. Cercospora Dioscoreae Ell. & Mart. in Amer. Naturalist, XVI, p. 1003 (1882). On *Dioscorea sativa*, Kipayo, *Dummer 1495 a*.

99. **Cercospora Dracaenae** Hansford, sp. n. *Maculae* primo rotundatae, 5 mm. diam., flavo-luteae margine brunneae, demum majores confluentes usque ad 30 mm. diam., zonatae, arescentes, secedentes. *Stromata* amphigena, circa 30 μ diam., erumpentia. *Conidiophora* fasciculata ex stromate singulo (—20) oriunda, olivacea, septata, superne nodulosa, usque ad 180×5—6 μ. *Conidia* hyalina, filiformia, 4—9-septata, basi truncata, superne attenuata, 100—180×3—4 μ.

Hab. in foliis *Dracaenae ugandensis*, Mukono, *Hansford 1982*.

100. Cercospora euphorbiicola Atk. in Bull. Cornell Univ., III, p. 41 (1897). On *Euphorbia*, Kampala, *Hansford 1406*.

101. Cercospora Fici Heald & Wolf in Mycologia, III, p. 16 (1911). On *Ficus urceolaris*, Kampala, *Hansford 1303 p.p.*

102. Cercospora ficina Tharp in Mycologia, IX, p. 109 (1917). On *Ficus urceolaris*, Kampala, *Hansford 1303 p.p.*

103. Cercospora flagellaris Ell. & Mart. in Amer. Naturalist, xvi., p. 1003 (1882). On *Phytolacca dodecandra*, Entebbe Road, *Hansford 1813*.

104. Cercospora fusimaculans Atk. in Journ. Elisha Mitchell Sci. Soc., viii, p. 50 (1892). On *Paspalum scrobiculatum*, Kampala, *Hansford 901* ; on *Panicum*, Kigezi, *Hansford 2190* ; on *Beckeropsis uniseta* Kigezi, *Hansford 2198* ; on *Rottboellia exaltata*, Kampala, *Hansford 1248*.

105. Cercospora Gloriosae Syd. in Ann. Crypt. Exot., ii, p. 266 (1929). On *Gloriosa virescens*, Kampala, *Hansford, 1315*.

106. Cercospora gossypina Cooke in Grevillea, xii, p. 31 (1883). On cultivated cotton, *Snowden 1006, Hansford 1293, 1664*.

107. Cercospora Gratiolae Ell. & Ev. in Journ. Mycol., viii, p. 71 (1902). (?) On *Sesamum angolense*, Entebbe, *Hansford 1864*.

108. **Cercospora Harrisoniae** Hansford, sp. n. *Maculae* superne purpureae, orbiculares, emarginatae, 1–4 mm. diam., inferne velutinae olivaceae. *Conidiophora* fasciculata (–25), erecta, simplicia, 1—3-septata, olivacea, 20—40 × 6—7 μ. *Conidia* singula terminalia, dilute olivacea, obclavata, ad apicem attenuata et pallidiora, subrecta vel curvula, 3—9-septata, 40—90 × 6—8 μ, superne 2 μ crassa, basi attenuato-truncata.

Hab. in foliis *Harrisoniae abyssinicae*, Serere, *Hansford 1604*.

In the structure of the conidiophores and stroma this fungus approaches *Camptomeris* ; it causes severe defoliation.

109. Cercospora Henningsii Allesch. apud P. Henn. in Pilze Ost.-afr., vol. C., p. 35 (1895). On *Manihot utilissima*, *Small 372*, *Hansford 1808*, common everywhere ; on *M. Glaziovii*, *Dummer 1320*.

110. Cercospora heteromalla Syd. in Ann. Mycol., xxii, p. 433 (1924). On *Rubus*, Mt. Nkokonjeru, *Hansford 797*.

111. Cercospora Hibisci Tracy & Earle in Bull. Torr. Bot. Club, xxii, p. 179 (1895). On *Hibiscus esculentus*, Kampala, *Hansford*.

112. Cercospora hibiscina Ell. & Ev., emend. Stevens & Solheim in Mycologia, xxiii, p. 382 (1931). On *Hibiscus* sp., Kampala, *Hansford 1272*.

113. **Cercospora kampalensis** Hansford, sp. n. *Maculae* amphigenae, superne cinereo-brunneae, margine atro-brunneae, orbiculares vel irregulares usque ad 10 mm. diam., inferne brunneae. *Conidiophora* dense fasciculata per stomata folii, hypophylla, olivacea, 5—20 × 3—4 μ. *Conidia* singula terminalia, hyalina vel dilute olivacea, filiformia, plus minusve curvata, 3—7-septata, 40—90 × 2—2·5 μ, basi truncatula, apice subacuta attenuata.

Hab. in foliis *Cissampeli mucronatae*, Kampala, *Hansford 917*.

114. Cercospora Kopkei Krüger in Ber. Zuck. in West-Java, i, p. 115 (1890). (?) On *Sorghum* race '*barbuda*', Kampala, *Snowden 1000*.

115. Cercospora leprosa Speg. Fung. Guar. i, p. 167 (1884). On *Markhamia platycalyx*, Kampala, *Hansford 1261*.

116. Cercospora longissima (Cug.) Sacc., Syll., xviii, p. 607 (1906). On *Lactuca paradoxa*, Kampala, *Hansford 913*.

117. Cercospora longipes Butl. in Mem. Dep. Agr. India, Bot. Ser., i, no. 3, p. 41 (1906). On sugar-cane, *Snowden 988*, *Hansford*.

118. **Cercospora Maesae** Hansford, sp. n. *Maculae* 5–10 mm. diam.,

saepe confluentes, orbiculares, centro cinereo-brunneae, margine atro-brunneae. *Conidiophora* praecipue epiphylla, dense fasciculata, olivacea, ex stromate subepidermali oriunda, 5–20 μ longa. *Conidia* cylindracea, dilute olivacea, 1—5-septata, haud constricta, 70—130 × 2·5—4·5 μ, basi truncata, apice leniter attenuata, fortiter curvata.

Hab. in foliis *Maesae lanceolatae*, Kampala, *Hansford 1306*.

The conidiophores hardly project above the stroma and surface of the leaf, and the apices of the conidia are divergent above with the bases parallel and close fasciculate.

119. Cercospora Mangiferae Koord., Bot. Unters., p. 236 (1907). On *Mangifera indica*, Kampala, *Hansford 1799*.

120. Cercospora megalopotamica Speg. in Fung. Argent., iv, no. 342 (1882). On *Bidens pilosa*, Kampala, *Hansford 1189*; Mulange, *Dummer 3940*.

121. Cercospora mucunicola Cif. & Frag. in Bol. R. Soc. Espan. Hist. Nat., xxvi, p. 248 (1926). On *Mucuna pruriens*, Kampala, Serere, Kawanda, *Hansford*.

122. Cercospora Musae Zimm. in Centralbl. Bakt. Abt. II, viii, p. 219 (1902). On *Musa sapientum*, Kampala, *Hansford 1317*.

123. Cercospora Nicotianae Ell. & Ev. in Proc. Acad. Sci. Philad., 1893, p. 170. On tobacco, Bukalasa, *Hansford*.

124. Cercospora nigri Tharp in Mycologia, ix, p. 112 (1917). On *Solanum nigrum*, Mulange, *Dummer 3936*; Kampala, *Hansford 1127*.

125. **Cercospora Oldenlandiae** Hansford, sp. n. *Maculae* indeterminatae, effusae, olivaceae, demum velutinae. *Conidiophora* amphigena, praecipue hypophylla, atro-olivacea, fasciculata (—50), ex stromate 25–40 μ diam. in stomate folii, 30—100 × 4—5 μ simplicia, flexuosa, superne geniculata et pallidiora, 0—3-septata. *Conidia* hyalina vel dilute olivacea, filiformia, superne attenuata, subrecta, 1—4-septata, 40—80 × 3—4·5 μ, basi truncata hilo plano olivaceo praedita.

Hab. in foliis *Oldenlandiae*, Serere, *Hansford 1577*; in foliis *Borreriae sinensis*, Ankole, *Purseglove 564*.

126. **Cercospora Papayae** Hansford, sp. n. *Maculae* atro-brunneae, irregulares, 5–10 mm. diam., confluendo majores. *Conidiophora* praecipue epiphylla, fasciculata (—30), atro-olivacea, erecta, superne nodulosa, 2—4-septata, simplicia, 80—130 × 4—5 μ. *Conidia* hyalina, filiformia, superne attenuata (—1 μ), 8—17-septata, basi rotundata, hilo olivaceo praedita, 100—180 × 4—4·5 μ.

Hab. in foliis *Caricae papayae*, Kampala, *Hansford 1800*.

The leaf-spots are irregular and usually delimited by the veins of the leaf. Prof. Chupp informs me that he has received this species from the West Indies and from S. America and has held it under the name given above. The conidiophores are characteristic in showing abrupt geniculations at the attachments of the conidia and the conidial scars remain as dark olive raised and thickened areas of the wall.

127. Cercospora personata (Berk. & Curt.) Ell. & Ev. in Journ. Mycol., i, p. 63 (1885). On *Arachis hypogaea*, *Dummer 1301*, *Snowden 723*, *Small*, *Hansford*; common everywhere. On ? *Cassia corymbosa*, *Dummer 1302*.

128. Cercospora polygonacea Ell. & Ev. in Journ. Mycol., I, p. 24, (1885). On *Fagopyrum esculentum*, Serere, *Hansford 1665*; Bukalasa, *Hansford 1279*.

129. Cercospora Pseudarthriae Petch in Ann. Roy. Bot. Gard. Perad., VI, p. 250 (1917). On *Pseudarthria Hookeri*, Kampala, *Hansford 1086*; Serere, *Hansford 1591*; Jinja Road, *Hansford 1765*; *Dummer 2350*.

130. Cercospora pulcherrimae Tharp in Mycologia, IX, p. 114 (1917). On *Euphorbia pulcherrima*, Kampala, *Hansford 1855*.

131. Cercospora ricinella Sacc. & Berl. in Atti R. Istit. Veneto Sci. Lett. ed Arti, ser. 6, III, p. 721 (1885). On *Ricinus communis*, Kampala, *Hansford 838, 1776*.

132. Cercospora rigospora Atk. in Journ. Elisha Mitchell Sci. Soc., VIII, ii, p. 65 (1892). On *Physalis peruviana*, Mulange, *Dummer* 4020.

133. Cercospora rosicola Pass. in Thüm., Mycol. Univ., no. 1086 (1878). On roses, Kampala, *Hansford 1830*.

134. Cercospora sapiicola Speg. in Mycol. Arg., V, p. 442 (1910). On *Sapium Mannianum*, *Dummer 4413*.

135. Cercospora Sesami Zimm. in Ber. Land. u. Forstw. Deutsch Ost-Afr. II, p. 29 (1904). On *Sesamum indicum*, *Snowden 990*; *Hansford 1868*; common.

136. Cercospora Setariae Atk. in Journ. Elisha Mitchell Sci. Soc., VIII, ii, p. 50 (1892). On *Digitaria scalarum*, Kampala, *Hansford 899*.

137. Cercospora Solani Thüm. Contr. Mycol. Lusit. II, no. 213 (1879). On *Solanum nigrum*, *Dummer 2402*.

138. Cercospora Sorghi Ell. & Ev. in Journ. Mycol., III, p. 15 (1887). On *Sorghum* spp., *Snowden 1000 p.p.*, *Hansford 1217 a*, common everywhere.

139. Cercospora sublateritia P. Henn. in Ann. Mus. Congo, II, p. 104 (1904). On *Vernonia*, Kampala, *Hansford 1237*.

140. **Cercospora tomentosae** Hansford, sp. n. *Maculae* cinereo-brunneae, emarginatae, usque ad dimidium folii occupantes. *Conidiophora* epiphylla, fasciculata (—50), erecta, simplicia, olivacea, recta vel flexuosa, 1—3-septata, 50—200×4—5 μ. *Conidia* filiformia, olivacea, 1—8-septata, 20—90×4—5 μ, basi rotundata, hilo atro-olivaceo subplano praedita, apice attenuata (2 μ) rotundata.

Hab. in foliis *Erythrinae tomentosae*, Gayaza, *Hansford 1170*. Prof. Chupp notes that this differs from *C. Erythrinae* and *C. erythrinicola* in having coloured spores and from *C. Pittierii* in its fasciculate erect unbranched olive conidiophores.

141. Cercospora Triumfettae Syd. in Ann. Myc., XXVIII, p. 218 (1930). On *Triumfetta tomentosa*, Kampala, *Hansford 1083*.

142. Cercospora truncatella Atk. in Journ. Elisha Mitchell Sci. Soc., VIII, ii, p. 44 (1892). On *Passiflora*, Kampala, *Hansford 1273*.

143. **Cercospora ugandensis** Hansford, sp. n. *Conidiophora* amphigena, fasciculata (6–15), dense dispersa, erecta, divergentia, dilute olivacea, 0—1-septata, subrecta vel superne geniculata, simplicia, 50—70×5—7 μ. *Conidia* obclavato-filiformia, hyalina, subrecta, 5—9-septata, 80—150×3—5 μ, basi rotundata hilo olivaceo subapiculato praedita, superne attenuata (—1·5 μ).

Hab. in foliis *Marisci*, Kampala, *Hansford 1311*.

The stromata are small and olivaceous, distributed in close lines along the leaf; the fungus causes the death of irregular areas of the terminal part of the leaves and bracts, extending downwards.

144. Cercospora Violae Sacc. in Nuovo Giorn. Bot. Ital., VIII, p. 187 (1876). On *Viola tricolor*, Kampala, *Hansford 2461*.

145. Cercospora viridula Ell. & Ev. in Journ. Mycol., V, p. 70 (1889). On *Ipomoea* sp., Entebbe Road, *Hansford 2096* (*leg. Chandler*).

This material differs from the description in absence of leaf-spots and in longer conidiophores (300—600×5—6 μ).

TUBERCULARIACEAE.

1. **Dendrodochium coniosporiicola** (P. Henn.) Hansford, comb. n. *Fusarium coniosporiicola* P. Henn. in Fl. du Bas. et Moy. Congo, II, ii, p. 106 (1907). *Fusidium coniosporiicola* (P. Henn.) Wollenw. Fusaria auto. del. no. 977 (1917). On *Phragmocauma viventis* on *Albizzia zygia*, Entebbe Road, *Hansford 1537*, Serere, *Hansford 1597*; on *Dothideaceae* on *Acacia*, Katakwi, *Hansford 1669*; on *Pseudothis* on *Albizzia zygia*, Serere, *Hansford 1607*. (*Dendrodochium Phragmocaumae* Hansford, a *nomen nudum* in E. Afr. Agr. Journ., III, p. 420 1937, is this fungus.)

It infects the ostioles of the host fungus and spreads over the stromata and the leaf surface as a thin coat of hyaline hyphae from which arises the dense mass of red to pink, branched or forked conidiophores bearing a waxy layer of conidia.

2. Dendrodochium gigasporum Bres. & Sacc. in Atti Accad. Sci. Lett. Arti Agiati, ser. 3, III, p. 120 (1897). Cultured from dying stems of *Cajanus indicus*, Kampala, *Hansford*! The conidiophores are much branched and produce single terminal exogenous conidia from the ends of the branches; each conidium falls off prior to the formation of its successor. Conidia 17—25×8—11 μ (ex descr. 24—30×8—10 μ).

3. Volutella sp., cf. V. minima von Hoehn., Fragm., IX, p. 83 (1909). On dead wood, Kampala, *Hansford 1140*.

4. Volutella sp., cf. V. gilva (Pers. ex Fr.) Sacc. in Michelia, II, p. 289 (1882). On leaves of *Annona Cherimolia*, Kampala, *Hansford 1805*.

5. Tubercularia coccicola Stevenson in Ann. Rep. Ins. Exper. Sta. Porto Rico, 1917, p. 92. On scale insects on *Citrus* spp., Kampala, *Hansford 922, 1153*, etc., common in wet weather.

6. Tubercularia versicolor Sacc. in Nuovo Giorn. Bot. Ital., VIII, p. 197 (1876). On renewing bark surface of *Hevea*, Mubango, *Snowden 489*.

7. Tuberculina persicina (Ditm.) Sacc. in Michelia, II, p. 34 (1880). On *Aecidium* on *Cissus*, Kirerema, *Dummer 2747*; do., Kampala, *Hansford 1374*.

Hansford 1217 on *Puccinia Pentadis-carnuae* on *Pentas* differs from the above in its ellipsoid spores 9—10×5—6 μ.

8. Beniowskia sphaeroidea (Kalchbr. & Cooke) Mason in List II, I, p. 26, Imp. Bur. Mycol., 1928. On *Pennisetum purpureum*, *Small 251*,

Hansford 737, etc.; on *Brachiaria brizantha*, *Hansford 752*; on *Setaria sphacelata* Kampala, *Hansford*; on *Panicum maximum*, Kampala, *Hansford*. Very common in wet weather on leaves of all the larger grasses in many parts of Uganda. In some collections the spores appear to be catenulate.

9. Sphacelia sp. An undetermined species is occasional on *Pennisetum spicatum* (*Small 595*) and on *P. purpureum* (*Small 274, 582, Dummer 1127*) in Uganda, forming large corky outgrowths on the culms. In later stages the stromata are covered by other fungi and hitherto no ascus stage has been discovered.

10. Aegerita Duthei Berk. in Gard. Chron., N.S. xvii, p. 401 (1882). On termite combs, apparently a constant inhabitant, *Hargreaves*, *Hansford*.

11. Fusarium avenaceum (Fr.) Sacc., Sylloge, iv, p. 713 (1886). On *Citrus* twigs, Kampala, *Hansford 1777*.

12. Fusarium coccophilum (Desm.) Wollenw. & Reink., Die Fusarien, p. 34 (Berlin, 1935). On scales on *Hovenia dulcis*, Kampala, *Hansford 2137*.

13. Fusarium graminearum Schwabe in Fl. Anhalt, ii, p. 285 (1839). On *Andropogon*, Kampala, *Hansford 1573*; on *Oryza sativa*, Kampala, *Small 573*; on *Zea Mays*, Masindi, *Hansford 1011*; on *Eleusine coracana*, Serere, *Hansford*.

14. Fusarium heterosporum Nees ex Fr., Syst. Mycol., iii, 2, p. 472 (1832). On inflorescence of *Brachiaria brizantha*, Entebbe, *Maitland 472*; of *Panicum maximum*, Kipayo, *Dummer 1468*, Kampala, *Small 8*, *Hansford*, very common; of *Sorghum*, *Snowden 998*.

15. Tetracrium coccicola Hoehnel, Fragm., xiii, p. 30 (1911). On scales on *Citrus*, Kampala, *Hansford*, common.

16. Epicoccum neglectum Desm. in Ann. Sci. Nat., 2 sér., xvii, p. 95 (1842). On plant debris, *Small*, *Hansford*, common.

17. Epicoccum purpurascens Ehrenb. ex Wallr., Fl. Crypt. germ. ii, p. 234 (1833). On plant debris, *Hansford*; spore formation in culture is often scanty, the agar developing much orange-brown pigment.

18. Epicoccum vulgare Corda, Icones, i, p. 5 (1837). Common saprophyte in soil, on plant debris and on wet paper, also as a mould on surface of living plants, *Dummer 608*, *Hansford 1048*; in culture does not develop pigment.

19. Chaetostroma atrum Sacc. in Michelia, ii, p. 174 (1882). On dead leaves of *Pennisetum clandestinum*, Kampala, *Hansford 840*; on *Sorghum verticilliflorum*, *Hansford 1057*.

20. Septoidium lateritium (Syd.) Arnaud in Ann. des Epiphyties, vii, p. 106 (1921). *Exosporium lateritium* Syd. in Ann. Mycol., xi, p. 406 (1912). On leaves of *Sapium Mannianum*, *Dummer 1117*, *Hansford 1784, 1989, 2264*.

21. **Camptomeris Albizziae** (Petch) Mason, comb. n. *Helminthosporium Albizziae* Petch in Ann. Roy. Bot. Gard. Peradeniya, iv, p. 306 (1909). On leaves of *Albizzia grandibracteata*, *Hansford 2333*; on *Albizzia* sp., *Hansford 1605*; on *A. coriaria*, *Hansford 1585*.

22. **Camptomeris Tephrosiae** Hansford, sp. n. *Maculae* epiphyllae, flavidae, elongatae, in centro brunneae, hypophyllae, indistinctae, dilute

flavo-brunneae. *Sporodochia* plerumque hypophylla, minuta, atra, pulvinata, circa 100 μ diam. *Conidiophora* radiantia, plus minusve erecta, recta, olivaceo-brunnea, 2—3-septata, haud constricta, simplicia, 30×10 μ, inferne attenuata. *Conidia* clavato-cylindracea, atro-brunnea, levia, 3—5-septata, leniter constricta, basi truncata, apice rotundata, $50—95 \times 16—22$ μ.

Hab. in foliis *Tephrosiae candidae*, Kampala, *Hansford 1862*.

Causes defoliation of the host; the leaf-spots are lenticular, elongated along the lateral veins of the leaflets. There is little differentiation of the conidiophores and conidia, together each consists of a single row of cells which break off at a septum, the outer wall remaining as a broken ring around the apex of the 'conidiophore' and around the base of the 'conidium' (fig. 12 on p. 51).

23. Cerebella Andropogonis Ces. in Bot. Zeit., IX, p. 669 (1851). On *Sorghum sudanense*, *Small 656*; on *S. verticilliflorum*, *Hansford 824*.

24. Cerebella Cynodontis Syd. in Ann. Mycol., X, p. 45 (1912). On *Cynodon dactylon*, Teso, *Hansford 1655*.

25. Cerebella Sorghi-vulgaris Subram. in Journ. Proc. Asiat. Soc. Bengal, N.S., XVII, p. 206 (1921). On *Sorghum vulgare*, *Snowden 685*.

26. Spegazzinia Meliolae Zimm. in Centralbl. Bakt., Abt. II, VIII, p. 221 (1902). *Isthmospora spinosa* Stevens in Bot. Gaz., LXV, p. 244 (1918). *Spegazzinia meliolicola* P. Henn. in Hedwigia, XLIII, p. 398 (1904). *Tetrachia singularis* Sacc. (vide Sydow in. Ann. Mycol., XVIII, p. 187, 1920). ? *Stemphylium muriculatum* Sacc. in Atti Accad. sci. Ven.-trentino, X, p. 86 (1917). On *Meliola*, common, *Hansford 1756*, *1760*, etc. (*Spegazzinia Coffeae* P. Henn. ex descr. appears to be the same fungus) (fig. 13 on p. 51).

27. **Spegazzinia Chandleri** Hansford, sp. n. *Sporodochia* atra, effusa, in plagulis *Meliolae* parasitica. *Conidiophora* erecta, atro-olivacea, 0-septata, 25×3 μ, conidium singulum terminale efformantia. *Conidia* muriformia, subsphaeroidea, ex cellulis olivaceis 7 et hyalinis 2 composita, setis 2–5 hyalinis filiformibus usque ad $15 \times 1{\cdot}5$ μ ornata, circa 10 μ alt. et 15 μ diam.

Hab. in plagulis *Meliolae Rhois* var. *minor* in foliis *Rhois glaucescentis*, Lake Nabugabo, Masaka, *Hansford 2133* (*leg. Chandler*).

The conidia (fig. 14 on p. 51) are flattened sphaeroid with 2–5 hyaline setae, and consist of two small basal dark brown cells bearing a central top cell surrounded by two pairs of dark brown smooth cells and two single hyaline cells on opposite sides. The last bear the setae. All cells have smooth walls.

28. Spegazzinia ornata Sacc., emend. van Overeem in Bull. Jard. Bot. Buitenzorg, ser. 3, V, p. 280 (1925). On stolons of *Panicum repens*, *Hansford 2249* (*ex H.B. Johnston 941*); on dead grass leaves, Toroma, *Hansford*.

STILBACEAE.

1. Stilbum fasciculatum Berk. & Br. in Ann. Nat. Hist., ser. 2, V, p. 465 (1850). On dead branch of a Mango tree, *Small*; on *Caesalpinia* sp., *Snowden 685*; on *Theobroma*, *Snowden 683*.

2. Hirsutella floccosa Speare in Mycologia, XII, p. 69 (1920). On a dead insect, Kampala, *Hansford 1316*.

3. HIRSUTELLA sp. On *Habrochila placida* on *Coffea robusta*, Kampala, *Hansford 1905*.

The insect host has a very thin covering of white hyphae, which may be entirely lacking ; from the host about 6 pale to dark brown threads radiate over the surface of the leaf, to which they are attached at intervals, up to 10 mm. long, simple or branched and consisting of parallel septate pale yellow-brown sterile hyphae. From these threads arise vertical branches of similar structure, but with the ' basidia ' of the fungus scattered over the top half of the surface. Basidia at first

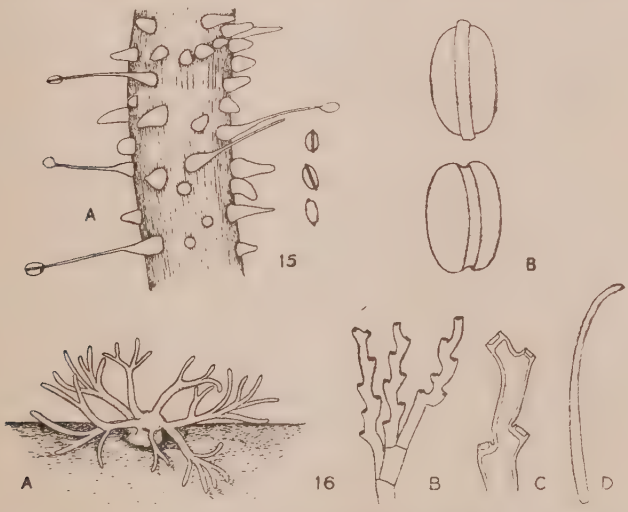

FIG. 15.—*Hirsutella* sp., ×500. A, Part of clava and conidia. B, Mature conidia, greatly enlarged. FIG. 16.—*Pterulopsis Dummeri* : A, Fungus in situ, ×5. B, Conidiophores, ×1000. C, Conidial scars, greatly enlarged. D, Conidium, ×1000.

spheric to ovate, finally with a single apical sterigma up to 28×1 μ, bearing a single conidium at the apex. Conidia ovate with a meridional ring continuous with the sterigma, continuous hyaline smooth walled, 6—7×3—4·5 μ. The ring of the conidium finally shrinks to form a groove in mature conidia separating the two halves of the thicker wall ; the latter are occasionally yellowish (fig. 15 on p. 63).

4. ISARIA ACERVATA Massee in Kew Bull. 1901, p. 167. On dead wood, *Dummer 1175, 1195*.

5. ISARIA CONGESTA Berk. & Br. in Journ. Linn. Soc. Lond., XIV, p. 96 (1875). On dead wood, Kipayo, *Dummer 1173* ; Mt. Elgon, *Small 240*.

6. **Isaria Meliolae** Hansford, sp. n. *Hyphae* in mycelio *Meliolae* parasiticae, hyalinae, 2–3 μ crassae, septatae, dense ramosae, reticulatae. *Coremia* laxe dispersa, erecta, albida, simplicia, 600—900×50—75 μ ;

clavulae elongatae usque ad 250 μ et 100–150 μ diam. *Phialides* laterales et terminales ex hyphis clavae oriundae, 12—20×3—3·5 μ, ampullaceae, collo 5×1—2 μ praeditae. *Conidia* catenulata (2–3) vel singula, elliptica vel fusoidea, hyalina, levia, 5·5—8×1·5—2 μ.

Hab. in plagulis *Meliolae* in foliis ignotis, Mt. Nkokonjeru, *Hansford 791*.

The conidia are produced in rapid succession from the phialides and sometimes hang together in very short chains.

7. Isaria Sphingum Schw., Syn. Fung. Carol., p. 100 (1822). On moth, Kipayo, *Dummer 1137*.

8. **PTERULOPSIS** Wakefield & Hansford, gen. nov. Stilbaceae, Hyalo-scolecosporae. *Synnemata* ramosissima, species *Pterulae* simulantia. *Conidiophora* numerosissima dense stipata, ramosa, geniculata. *Conidia* filiformia, hyalina, 0-septata.

Pterulopsis Dummeri Wakefield & Hansford, sp. n. *Synnemata* singula vel fasciculata, ex stromate pulvinato in cortice oriunda, albida, mollia, plerumque ramosa, 2–4 mm. alt. *Conidiophora* erecta, dense stipata, ramosa, alternatim geniculata, septata, circa 30 μ longa, 2–3 μ crassa. *Conidia* terminalia singula, hyalina, filiformia, continua, basi truncata, superne attenuata curvulaque, 30—40×1·5—2 μ.

Hab. in ligno emortuo, Mabira Forest, *Dummer 4030*.

The whole fungus is white and much resembles a minute *Pterula*, rather soft in texture. The stromata are single or divergent from a common basal pulvinate stroma in the bark of the substratum; each is much branched above and each branch is covered with a dense palisade of conidiophores. These arise as terminal and lateral branches from the hyphae of the tissue and are somewhat branched. The conidia are terminal and single, but the conidiophore grows past each scar, leaving an abrupt geniculation, to form others in succession; mature conidiophores are regularly zig-zag. The conidia are formed inside a minute cup-shaped scar which remains on the conidiophore; the base of the conidium is slightly attenuate and ends in a flat hilum (fig. 16 on p. 63).

9. Acarocybe Hansfordii Syd. in Ann. Mycol., xxxv, p. 285 (1937). On leaves of *Bridelia micrantha*, *Hansford 1079*, *1299*, etc.

10. Stysanus Stemonites (Pers. ex Fr.) Corda, Icon., i, p. 22 (1837). Isolated from soil, Kampala, 1928, *Hansford*.

11. Graphium rhodophaeum Sacc. & Trott. in Bull. Soc. Roy. Bot. Belg., xxxviii, p. 166 (1899). On twig of *Theobroma Cacao*, Kampala, *Snowden 684*; *Hansford 987*.

12. Graphium stilboideum Corda, Icones, ii, 16 (1838). On rice, Mbale, *Snowden 680*.

13. **Arthrobotryum parasiticum** (Wint.) Hansford, comb. n. *Arthrosporium parasiticum* Wint. in Hedwigia, xxv, p. 103 (1886). *Isariopsis penicillata* Ell. & Ev. in Bull. Torr. Bot. Club, xxii, p. 438 (1895). *Arthrobotryum caudatum* Syd. in Fl. Bas et Moy. Congo, iii, 1, extr. p. 22 (1909). *Arthrobotryum Tecomae* P. Henn. in Hedwigia, xliii, p. 397 (1904). (1909).

A very common parasite of *Meliola* spp. in Uganda, *Small 606*, *Hansford 804*, *1357*, etc. The mature spores are yellowish to smoky in colour; and transfer to *Arthrobotryum* brings it into the same genus as other parasites of *Meliola*.

14. ARTHROBOTRYUM MELANOPLACA Berk. & Curt. in Journ. Linn. Soc. Lond. x, p. 360 (1869). On *Meliola*: *Hansford 1409*, *2313*, etc. The hyphae of the stalk portion are slightly divergent above to form the clava and on their outer surface bear wart-like projections 1–2 μ high; the conidia are single and terminal, obclavate, 3-septate, the two middle cells largest and widest and dark brown with often a granular to verruculose surface; the basal cell is slightly narrowed to a truncate base and the apex is more or less attenuate into a beak; both end cells are paler. Conidia from *Wright 473*, Cuba in Herb. Kew (co-type) measure 33—60×7—11 μ.

Arthrobotryum scoparium P. Henn. (*Ule*, no. *3256* in Herb. Kew from Peru, on Menispermaceae, on *Meliola*) differs from the above only in shorter conidia with less development of the apical beak and in smooth walls; it is evidently synonymous. *Baker 478* on *Meliola*, Philippines, in Herb. Kew is *A. melanoplaca* and not, as labelled, *A. Penicillium* (Stev.) Speg.

A series of specimens collected by Deighton on *Meliola* on *Anisophyllea*, Sierra Leone, were examined in the Herbarium of the Imperial Mycological Institute, Kew:

M. 225 has conidia 35—45×8—12 μ often verruculose; other colonies have verruculose conidia 20—35×5—7 μ; *M. 1289 b* has conidia 25—30×6—8 μ verruculose. The first of these specimens appears to be within the range of *A. melanoplaca*, while the other two could be included in *A. Penicillium* (Speg.) Stevens, if this can be considered a distinct species and not merely a small-spored form of *A. melanoplaca*. Authentic material of *A. Penicillium* was not available for comparison.

15. ARTHROBOTRYUM GLABROIDES Stev. in Bot. Gaz., LXV, p. 237 (1918). *Deighton M 332 p.p.* on *Meliola* on *Coffea*, Sierra Leone, corresponds closely to the re-description of this species by Petrak & Sydow in Ann. Mycol., XXVII, p. 83, 1929; it differs only in having minutely verruculose conidia which are not mentioned in the description cited.

Deighton M. 1066 has slightly larger conidia of the same cylindric-fusoid type but with smooth walls; this may well be included in the same species.

16. **Arthrobotryum ugandense** Hansford, sp. n. *Synnemata* erecta, atro-brunnea, 100–150 μ alt., simplicia; caulis 10–15 μ diam.; capitulum sphaeroideum vel ovatum, luteo-brunneum, 40–60 μ diam. *Conidiophora* simplicia, conidium terminale singulum efformantia. *Conidia* fusoidea, subrecta, basi rotundata, apice attenuato-caudata, hyalina vel lutea, 15—28×4·5—5·5 μ.

Hab. in plagulis *Meliolae ugandensis* parasiticum, in caulis *Euphorbiae tirucalli*, Kampala, *Hansford 1106*.

In colour the whole fungus much resembles *A. parasiticum* being rather brown than black; mature conidia become yellow to pale brown and are much less beaked than in *A. parasiticum*. On dead wood, *Hansford 2067*.

[17. ARTHROBOTRYUM DIEFFENBACHIAE Stevens in Bot. Gaz., LXV, p. 237 (1918). *Deighton M 1441b.* on *Meliola* on *Anadelpha*, Sierra Leone agrees with the description of this species in that the synnemata are loose and cover or encase the setae of the host fungus, in many cases being merely a few parallel hyphae climbing up the setae, forming a

loose terminal "head" of conidiophores (up to 20) at the apex of the host seta, about 200 μ diam. The conidia are formed in succession from the end of the conidiophores, in a manner typical of many species of *Cercospora*, the conidiophores elongating and becoming geniculate at the scars of successive conidia. As far as I am aware this method of conidial formation is unique in *Arthrobotryum*. The conidia are yellow-brown, 50–80×3·5—5 μ 3-septate slightly attenuate to the truncate base and produced at the apex into a filiform beak 1–2 μ wide. In shape these conidia much resemble those of *A. parasiticum* but are much longer; those of *A. Dieffenbachiae* are given as 35—38×3—4 μ. No authentic material of the latter was available for comparison, and Deighton's specimen is included here only as an indication of its possible affinity with Stevens' species, though it might easily be included under *Cercosporella* or *Cercospora* if one regarded the "synnemata" as mere loose aggregations of parallel mycelial hyphae climbing up the setae in a manner similar to that of many species of *Cercospora*. Re-examination of authentic material of *A. Dieffenbachiae* may well reveal that this is merely a growth form of *A. parasiticum*.

Of the remaining species of *Meliola* hyper-parasites belonging to the *Stilbaceae*, the description of *Podosporium densum* Pat. strongly suggests close affinity with *Arthrobotryum parasiticum*; *Podosporium penicilloides* Karst. & Roum. ex descr. might well be included in *A. melanoplaca*; *P. concors* Sacc. appears ex descr. to be a short-caudate form of *A. melanoplaca*. The material in Herb. Kew of *A. Strychni* P. Henn. is too poor for determination; ex descr. it appears to be close to *A. glabroides* Stevens.]

18, Isariopsis griseola Sacc. in Míchelia, I, p. 273 (1878). On *Phaseolus* spp., *Hansford 854, 788, 784*, common.

19. Podosporium gigasporium Sacc. & Syd. in Ann. Mycol., XI, p. 319 (1913). On dead wood, *Hansford 2067*.

MYCELIA STERILIA.

1. Rhizoctonia Solani Kühn, Krankh. d. Kulturgew., p. 224 (Berlin, 1858). Common, causing disease of seedlings of many plants, *Hansford*!

2. Rhizoctonia batatícola (Taubenhaus) Butler, see under *Macrophomina Phaseoli*, p. 35 above.

3. Rhizoctonia lamellifera Small in Trans. Brit. Mycol. Soc., IX, p. 165 (1924). Following J. C. Hopkins, the forms with large sclerotia are here distinguished from those with small sclerotia, which are known to be the sterile stage of *M. Phaseoli*; the former occur in the roots and basal parts of the stems of large shrubs and trees, whereas the latter are usually restricted to herbaceous and small shrubby plants. In Uganda the large forms have been found on the roots of many trees, including *Acacia* spp., *Albizzia* spp., *Annona* spp., *Artocarpus integrifolia*, *Bixa Orellana*, *Camellia sinensis*, *Casuarina equisetifolia*, *Cinchona*, *Citrus*, *Coffea*, *Cupressus*, *Erythrina*, *Eucalyptus*, *Grevillea robusta*, *Hevea*, *Terminalia Catappa* (*Small, Hansford*).

4. Sclerotium Rolfsii Sacc. in Ann. Mycol., IX, p. 257, 1911). On *Dianthus caryophyllinus*, Kampala, *Small, Hansford*; on *Eleusine coracana*,

Swall ; on *Arachis hypogaea*, Sese, *Hansford* ; on leaf sheaths of sugar-cane, Lugazi, *Hansford* ; on cotton seedlings, Kampala, *Hansford* ; on *Medicago sativa* Serere, *Hansford*.

ACKNOWLEDGEMENTS.

In the preparation of this paper I have been fortunate in having received the benefit of the experience of the staff of the Imperial Mycological Institute, and especially of Dr. G. R. Bisby and Mr. E. W. Mason ; the conclusions drawn above on *Helminthosporium capense* incorporate much work done by these officers. Prof. C. Chupp kindly examined the Uganda collections of *Cercospora* and indicated which specimens he considered to represent new species, and these are described above. A number of the older specimens were determined by Miss Wakefield and her assistants at Kew Herbarium, and the majority of these have been accepted without re-checking.

[Part 1, pp. 1–67, *published* 15 *October* 1943.]

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